November, 1921

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The WIRELESS AGI

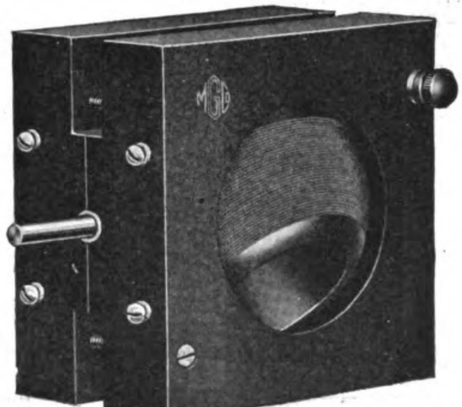
Volume 9

Number 2

Miss Anna Case, famous soprano of the Metropolitan Opera, singing in the radiophone operated by the N. A. W. A. for ten days of the Electrical Show at New York

Ten Triumphant Days of Radio at the Electrical Show

And Many Exclusive Features in This Issue



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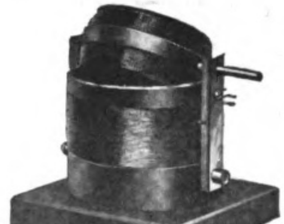

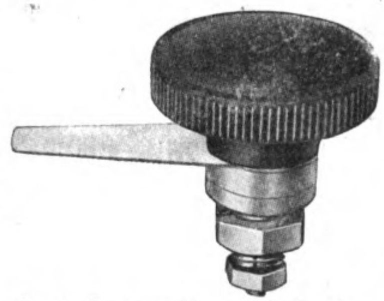

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Contents *of* THE WIRELESS AGE *for* Nov., 1921

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VOL. 9. No. 2 NOVEMBER, 1921

THE WIRELESS AGE

WORLD WIDE WIRELESS

Writing Transmitted by Radio

MESSAGES written in Europe have been transmitted by wireless to America and photographically reproduced in facsimile here at practically the same instant they were sent from the other side. They were from Premier Briand and Gen. Pershing in Paris and were received by Edouard Belin, at the United States Navy's radio station near Bar Harbor, Maine.

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Doctor's Radio Prescription Saves Crew

RADIO played a part in saving from death the captain and many of the crew of the steamship Wekika, which sailed from Charleston, September 4, for Bremen. The story was told when the steamship America arrived at New York. Across 500 miles of water Captain Forward of the Wekika gave his symptoms to Dr. Gordon Hislop of the America, and the latter not only diagnosed the case, but sent instructions for treatment by wireless.

On September 15, according to Captain Rind of the America, a wireless was received from the Wekika, some 500 miles away, stating that sickness had broken out on board, and that the skipper and several of the crew had been stricken. Capt. Rind wirelessed for the symptoms, and the reply came back promptly. The sufferers had been attacked with cramps, followed by alternating chills and fever.

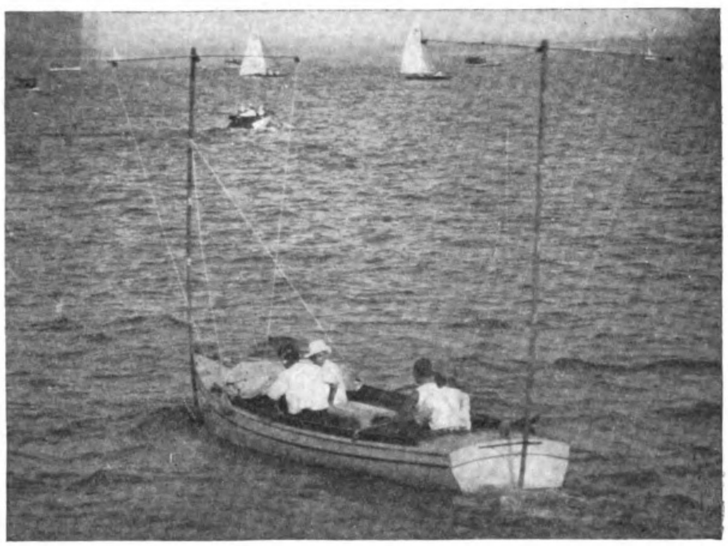
"Ptomaine poisoning," was Dr. Hislop's diagnosis, and he followed it with a prescription, which included opium tablets.

"Have been following instructions," was the next word from the Wekika. "Sick men well, with exception of myself and one seaman. Could you suggest other treatment than opium pills?"

Dr. Hislop reasoned it out that the captain had used the opium tablets for the crew and had not enough to use himself. He radioed back to substitute paragoric in one-ounce doses. Long afterward, and when the vessels were many miles apart, came a last message:

"Sick men and self getting along famously. Many thanks to you. Bon voyage."

This exchange of messages was of interest to twelve doctors who returned on the America. They came from various parts of Europe to study at the Rockefeller Institute.



Radiotelephony was used by the Montreal "Standard" to report the International Yacht Races run on Lake St. Louis

Radio Reports Speejacks Safe

SEARCH in the Pacific Ocean for the private motor yacht Speejacks ended when wireless messages were received announcing that "All is well."

The radiogram was sent out by the United States Shipping Board Steamer "Eastern Queen," under whose convoy the Speejacks is proceeding to Tahiti. It was relayed from the offices of the steamship line to those of Lehigh Portland Cement Company in New York, and from New York on to Chicago. The message read:

"Newspaper items advise Speejacks wrecked near California coast. Disregard reports. U. S. & A. line advise us all is well."

Bernard F. Rogers, Sr., father of one of the other Chicagoans aboard the yacht, received a confirmatory telegram from the Shipping Board.

Receipt of the telegrams set at rest fears aroused by reports of a derelict yacht resembling the Speejacks having been sighted off Cape San Luca Lucas, Lower California. Although the missing yacht's wireless has a sending radius of 1,500 miles, it was not until trans-Pacific stations sent out a general alarm that trace of the vessel was obtained.

N. A. W. A. Radio Station and "Ku Kux" Call

WHILE broadcasting the second game of the world's series at the Polo Grounds to radio operators within a radius of 400 miles, J. O. Smith, the wireless telephone operator at the Electrical Show in the Seventy-first Regiment Armory, was interrupted by a call, "Ku Kux, Ku Kux."

This interference seemed to interest a few other operators, and a station in Pittsburgh and another in Cleveland asked if the message could be deciphered.

Smith was puzzled by the strange code. A Washington operator said he had heard the mysterious air signals frequently of late, and that he thought they were secret code messages of the Ku Klux Klan. This interference with the transmission of the baseball news aroused the ire of the majority of the radio-baseball fans. Soon after the delivery of the final word of the Yanks' 3 to 0 victory, Smith got busy to learn if any of the radio fans knew the station or the secret code of the "Ku Kux, Ku Kux" caller, but was unsuccessful. Later it developed that the signals heard had been sent from two Japanese ships outside the three-mile limit and the code used was the Japanese code, which is seldom heard in this part of the world.

Other freak wireless telephone happenings during transmission of the world's baseball series news were reported. One operator said that he was talking and receiving over a wireless telephone and that he wasn't connected to an antenna. Another radio operator said he had his radiophone connected to the buzzer or doorbell wires of his house and these wires were acting as an antenna.

Talking back and forth half an hour over a wireless telephone purposely disconnected from the aerial wires, Elmer E. Bucher, commercial engineer of the Radio Corporation of America, and J. Andrew White, president of the National Amateur Wireless Association, thrilled an audience of several score of wireless experts at the show.

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New Canadian Radio Station

EDMONTON and the outside world is soon to have direct wireless communication with Fort Norman and Fort Smith, as well as other northern points, according to the plans of a local firm which has just been granted a federal license for the operation of commercial wireless between these points. Marconi equipment will be used and the wireless operators will be brought from the coast. It is expected that the system will be in operation by early spring.

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Mexico to Use Radio for Troop Movements

PLANS are under consideration by the Mexican Government for the establishing of a wireless system, embracing the entire country, for use in emergencies by the War Department in directing the quick movement of troops to threatened points.

Five great stations are proposed. These are to be located in Mexico City, Torreon, Monterey, Guadalajara and Santa Lucretia. Smaller stations, according to the plans, are to be built in the capitals of the twenty-nine states and at various ports on the Gulf of Mexico and on the Pacific coast.

Where there are wireless stations there will also be airdomes. Airplanes, after scouting flights, will be able to send off immediate reports, if necessary, by wireless. Every military force on the march will be required to carry a wireless outfit and keep in touch with the nearest wireless station.

The gulf ports at which wireless stations will be built, if the plan is carried out in all its details, are Matamoras, Tampico, Tuxpam, Vera Cruz, Puerto Mexico, Progreso and Puerto Morelos.

Locations on the Pacific side will be San Quentin, Bahia, Magdalena, Topolobampo, Manzanillo, Acapulco and Salina Cruz.

While these plans are looked upon with favor by military authorities and are now before President Obregon, it is doubted that work upon such an expensive undertaking will be commenced while the Mexican Treasury is in its present lean condition.

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Shopping by Radio

"SHIP at once, 100 pounds of bacon. Rush!" This rush order came floating through the ether all the way from Rockville Center, L. I., to New Haven, intended for the Sperry & Barnes Company. Three hours later the goods were on their way to their destination, going on record as the first order received in New Haven over the wireless telephone and shipped in record-destroying time.

The message was received by Stal-Martino, of Woodbridge. It was sent out from Carmann's market, in Rockville Center. Martino relayed the order to the Sperry & Barnes concern, who made immediate preparations for shipping so as to serve their customer as quickly as possible, thereby establishing a precedent for speed in this direction as well.

This is believed to be the first real bona fide order to be received in New Haven, Conn., over the wireless telephone.

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Radio Stock Tickers for Ships

THE tired man with tickerosis will no longer be able to get a respite from the malady by taking a trip to sea. They are going to install tickers on ocean liners and the voice of the ticker will mingle with what the wild waves are saying. The idea and its execution is due to the Bowman group of hotels, according to Robert J. Kennedy, the Biltmore representative. Mr. Kennedy says:

"A powerful wireless equipment has been installed on the Commodore roof by direction of John McE. Bowman, President of the Bowman hotels. The wireless room has every facility and modern bit of apparatus for sending and receiving radio messages, with expert wireless operators in charge of Marshall C. Wright, chief radio operator."

Venezuela Builds Four Radio Stations

WIRELESS stations are being erected in Caracas, La Guaira, Maracay, Valencia and the other principal cities of the country, according to an announcement of the Venezulean Commercial Agency in New York City. The one at Caracas is to have exceptionally long range and is to be capable of communicating with similar stations in this country and in Europe. The other Venezulean stations, a number of which are already in operation, are to be employed in transmitting official and private messages.

Importers and exporters have complained for some time of the inadequate cable facilities provided between the United States and Venezuela, and it is thought that the new wireless plant at Caracas will do much toward obviating these difficulties. At the same time the Government is planning the erection of a dozen or so lighthouses along the coast. Bids for these have been requested in this country, and the contract will probably go to an American firm.

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Berlin-Copenhagen Radiophone Service

A WIRELESS telephone service between Berlin and Copenhagen has just been established following successful experiments. Four kilowatt Poulson transmitters are used.

The inauguration of a general service marks progress in the experiments which have been carried on since December, 1920, when music was transmitted by wireless telephone from Berlin. Wireless telephone stations in England, at Sarajevo and at Moscow reported having heard it.

Experiments have proved successful with ships 900 miles out at sea.

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Japan Protests Chinese Radio Contract

JAPAN will protest against the signing with the Federal Radio Company of America for a wireless telegraph station at Shanghai, it is declared, by newspapers in Tokio. This country will hold, it is said, that signing the contract would be in violation of a previous engagement between China and the Mitsui Company, a Japanese concern.

Washington, D. C.—The State Department is without information regarding the latest protest which dispatches from Tokio assert the Japanese Government contemplates making to the Chinese Government against its contract with the American Federal Wireless Telegraph Company for erection of a wireless station at Shanghai. Minister Schurman at Peking informed the State Department recently that the supplemental agreement between the company and the Chinese Government was signed September 19, and the American Government's understanding of the situation is that the contract will be adhered to.

Protests were made early in the year by the British, Japanese and Danish governments, and an inquiry by the Chinese Minister to the United States Government brought from Secretary Hughes on July 1 the declaration that the United States regarded the protests against the contract as "founded upon assertions of monopolistic or preferential rights in the field of Chinese Government enterprise which cannot be reconciled either with the treaty rights of American citizens in China or with the principle of the open door."

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Radio Stations and Central America

WITH the purpose of bringing about closer relations between Mexico and the Central American republics, President Obregon has offered to construct, free of charge, powerful wireless stations in Guatemala, Costa Rica, Honduras, Salvador and Nicaragua, according to Rafael Cardona Jimenez, the new Costa Rican Consul in Mexico City, who is on his way to the Mexican capital.

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Sweden Abandons Radio Plan

THE Swedish Government has abandoned its plan to erect a big, high-powered wireless station to communicate with America. The appropriation which parliament had authorized for the construction of the station has been withdrawn.

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Memphis Barge Line Erects Radio Stations

WORK on the towers for the wireless stations of the Federal Barge Line has started at Memphis.

W. B. Goltra, communication officer of the Mississippi-Warrior Service, offices in St. Louis, has arrived in Memphis to superintend the construction of the towers and buildings.

The towers will be 300 feet apart and the station will have a 1,200 wave meter length. It will be a similar station in every respect to the one erected at St. Louis.

There will be two stations along the Mississippi River, one at St. Louis and one at Memphis. Both will be opened for service in about two or three weeks or upon completion of the Memphis office.

Mr. Goltra announces that amateurs having wireless stations in Memphis must tune their stations down to 200 meters or under and shall not have over a half kilowatt input in the transformer. If they are in a radius of five miles of the barge line stations they must cut to half a kilowatt. This does not include license for commercial stations.

The wireless stations at Memphis will be operated day and night, although there will be no night service on the steamers of the barge line.

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Radio Research Station in Canada

LA PRAIRIE, a small town six miles from Montreal, is to be the site of one of the most complete wireless experimental research stations in the world, according to a statement made by A. R. Morse, managing director of the Marconi Wireless Telegraph Company of Canada.

Radiophone Installed in Fire Chief's Auto

CHIEF McGILL, of the Trenton Fire Department, has had a wireless telephone set installed in his automobile and will hereafter be able to keep in communication with fire headquarters without having to leave the scene of fires. Tests have been made and the radio apparatus found to be efficient in every detail.

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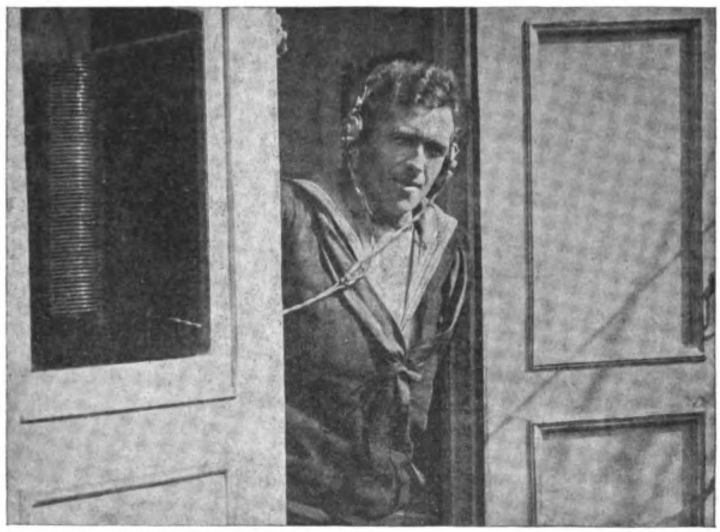
San Francisco is Radio Centre of the Pacific

SAN FRANCISCO is the communication centre of the Pacific, linking by postal telegraph and cable services and by radio the hundreds of millions who live on the other side of the Pacific and the millions in North America. Its central location in the line of world communication has already attracted to San Francisco several corporations whose business it is to serve the need for radio service.

These are some of the features of a report prepared for the San Francisco Chamber of Commerce by Arthur A. Isbell, general superintendent of the Radio Corporation of America, with headquarters in San Francisco, by Dr. Frederick A. Kolster, San Francisco engineer, and by V. S. McClatchy, publisher of the Sacramento *Bee*.

The Radio Corporation of America is the first company to bridge the Pacific by wireless. Mr. Isbell, superintendent, states that the new San Francisco-to-Japan radio having proved its usefulness to commercial interests, the service was extended a year ago to British Columbia, Washington, Oregon, all of California, and, in March, this year, with New York connections established, the system was placed in service for the entire United States.



Harold Watts, the radio operator aboard Shackleton's exploration ship "Quest"

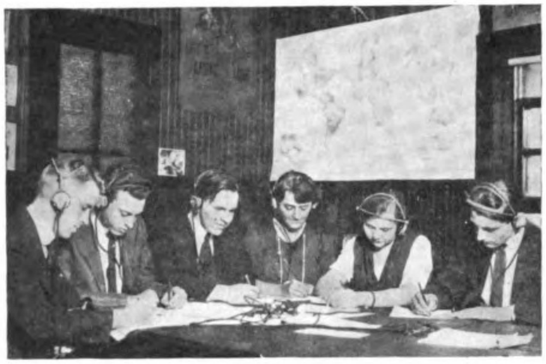
Radiophone Used in Golf Tournament

THE wireless telephone for transmitting hole-by-hole play was used for the first time by the St. Louis Post-Dispatch in the national amateur golf tournament held at the St. Louis Country Club. That paper thus describes the experiments:

"A wireless operator with a portable apparatus accompanied a Post-Dispatch reporter who followed the play of one of the important matches.

"By this method, the hole-by-hole report almost uniformly reached the Post-Dispatch office immediately after each play was completed. There were only a few delays, and these of small consequence, during the week.

"The test showed that the wireless telephone is likely to become an adjunct to news reporting in instances where the terminals of the telephone and telegraph are removed from the scene of action and the field set of the wireless can be carried along, always commanding a view of the action."



The jamming contest held under the auspices of the N. A. W. A. at the Electrical Show

B. B. Jackson, the winner of the jamming contest

The receiving contest was won by B. G. Seutter (shown seated at the left) with 44.3 words per minute

Ten Triumphant Days of Radio at the Electrical Show

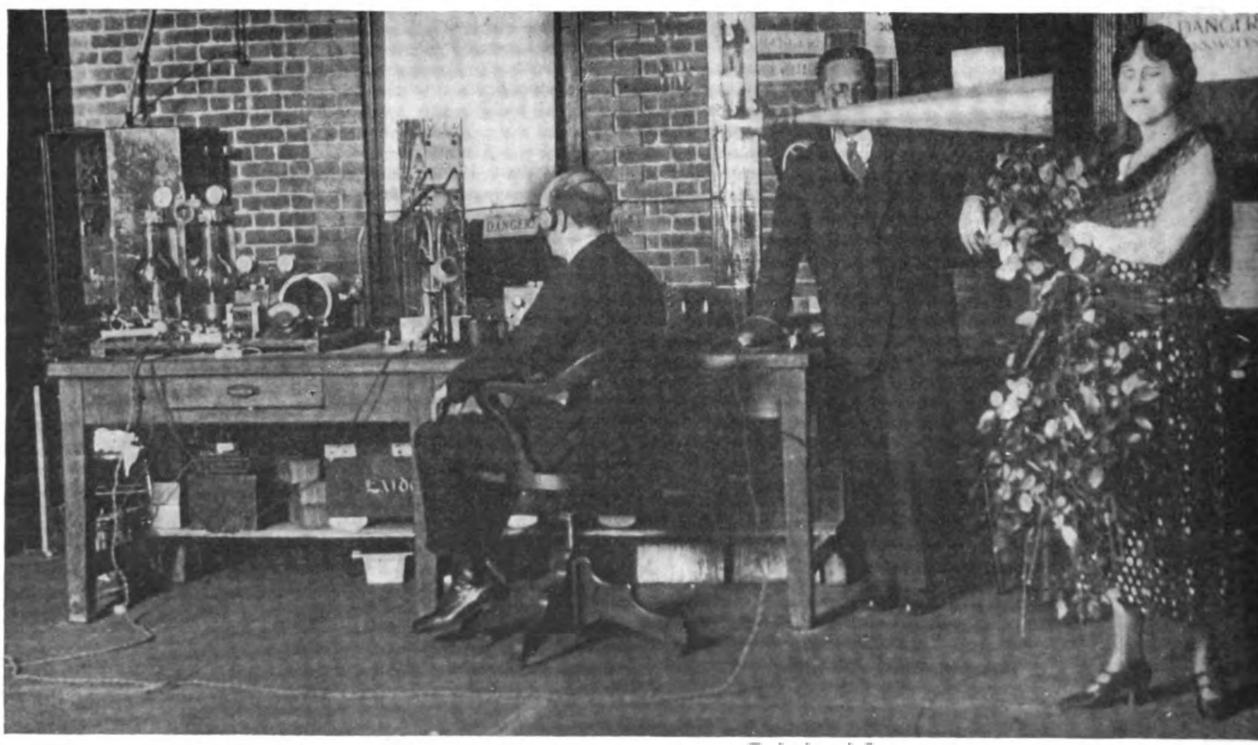
The great artists of opera, concert and the musical world speak, sing and play to thousands by radiophone

OPERA STARS, famous concert singers, instrumentalists of world-wide reputation and composers of epic music, gave their best to the radio amateurs of the New York district by radiophone under the direction of the National Amateur Wireless Association during the New York Electrical Show, September 28 to October 8, inclusive.

For several years music has been broadcasted by radiophone at intervals, generally from phonograph records, and occasionally by artists singing directly into the transmitter, but radiophone broadcasting of speech and music came into its own in its new and greater role as an entertainer and educator when some of the greatest artists of opera, concert and the musical world generally, used it as a direct means of speaking, singing and playing to thousands of highly appreciative listeners throughout the Metropolitan district and nearby States.

The nights of music during the show provided undoubteedly the greatest combination of art and science yet realized, and the fact that the voices and the music of great artists were successfully transported through space to thousands of listeners in their homes, where in numberless cases whole families and their friends formed appreciative audiences, unmistakably made the whole undertaking a conspicuous and brilliant success and established a new milestone along the road of scientific and artistic achievement in radio communication.

As one of the listeners expressed it, "The atmosphere of the concert hall was so faithfully transmitted, that we felt we were actually mingling in the room among an assemblage of distinguished and even famous persons. We did not feel that we were listening to a concert. It was more as if we were guests at your party."



Anna Case, grand opera star from the Metropolitan Opera Company sang "Ave Maria" and "Old Mother, My Love,' to the delight of thousands of radiophone listeners

Practically the same thought was expressed by the New York Times in the following:

"The audition was perfect — the Times receiving station caught the strains of the music with a faithfulness that was startling. It seemed as if the players and singers were right in the room."

The first radiophone concert was broadcasted on the night of September 29. The feature of the evening was Miss Anna Case, of the Metropolitan Opera Company, who sang "Ave Maria," and "Old Mother, My Love," to piano accompaniment by Mr. Eugene J. Petke. Mr. Roland Farley, composer of the latter song, was one of the interested listeners in the audience of 300 in the radiophone room. Others who sang were Billy Cripps, a well-known singer of popular ballads, and Miss Marcella Shields, of Shields and Kane, of the Keith circuit. Sgt. Thomas Higgins, of the 101st Field Signal Battalion, played three banjo selections, with piano accompaniment.

On the evening of September 30, the feature of the program was Miss Sophie Tucker, headliner at the Palace Theatre that week, who sang "I'm Nobody's Fool," and "Dapper Dan," accompanied by her jazz band, known as the five kings of syncopation. Albert Spica's orchestra played the overture, "The Golden Sceptre," followed by Joseph Primavera, violinist, who played the "Humoresque." The balance of the programme consisted of eight popular

Mlle. Bertha Erza, French-Algerian dramatic soprano and artiste of the first order rendered "The Prayer" from La Tosca and Massenet's "Le Cid" followed by two English songs for an encore

numbers, five songs by Miss Shields and Mr. Cripps, and three banjo selections by Sgt. Higgins.

On the afternoon of October 1, a short musical programme interspersed with selections on the Ampico piano were given by Miss Dorothy Adrian, who sang the "Bird Song," from Pagliacci, and by Waldemar Rieck, who sang the "Clown's Lament," also from Pagliacci.

On the same evening the first of the recitals arranged in co-operation with The Evening Mail was held. The programme opened with an address by Miss Rose Roden on the new idea in music and the extension of the influence of letter music through radio broadcasting. Miss Clare Brookhurst, contralto, sang, "My Heart, at Thy Sweet Voice," Sargent's "Blow, BlowThou Winter Wind," Stults' "Sweetest Story Ever Told," Whelpky's "The Nightingale," Ralph B. Angell at the piano; Maxmillian Rose, violinist, played "Intrada," "Minute Etude," "Zapateado," Gluck's "The Ballet," and Wieniawski's "Russian Airs," with Gordon Hampson at the piano. John C. Freund, Editor of "Musical America," delivered a most illuminating address on the uplifting and humanizing power of music and referred to its broadcasting by radio as an agency for world peace through arousing new ideals and aspirations among thousands of people and determining for them the true meaning and purpose of life.

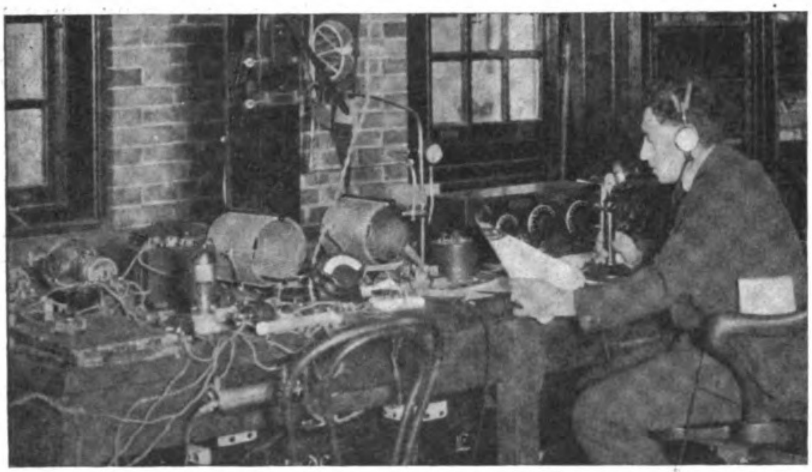
The address of Mr. Freund was listened to intently by everyone and undoubtedly stirred many who heard it to a realization of what the combining of the voices of artists and the science of radio communication really means to people as a whole. Mr. Freund said in part:

"It is certainly noticeable that the most powerful influence today which is drawing men closer together is music. The old antagonisms of race and religion, of politics, of class against class, are being if not obliterated, softened through the uplifting, humanizing, spiritual power of music.

Sophie Tucker, leading vaudeville star, and her jazz band rendered "I'm Nobody's Fool" and "Dapper Dan," which reached thousands of her admirers in their several homes by means of the radiophone

"We have discovered that music can help Americanize our alien population. We have discovered that music can relieve the mind of man from the monotonous, the deadly influence of the labor-saving machine. We have discovered the power of music to bring us all together. We have discovered the power of music to aid in developing not alone an individual, but a national conscience to which we can appeal if we would avoid the world catastrophe to which the ever increasing power of the forces of destruction would doom us unless we can develop the means of getting together and so preserving not alone the life of a nation, but of humanity itself.

"This invention by which one singing or playing alone can be heard in thousands of other places; this invention which can carry the human voice thousands of miles, will go far to bring us out of the chaos of conflict and carry us into the haven where peace and security exist."



A section of the N. A. W. A. radiophone broadcasting station at the N. Y. Electrical Show, showing the receiving apparatus and principal parts of the transmitting set

Two selections by the Knabe-Ampico reproducing piano followed, Chopin's "Waltz Op. 18," played by Sergei Rachmaninoff, and "Polonaise," played by Leopold Godowsky. Lighter entertainment concluded the evening's programme featured by banjo selections by Gus Smith of the "You Know Me, Al" company, and popular songs by Billy Berkes.

A novelty was introduced during this evening in the form of radio voice greetings from Yee Kee, president of the On Leong Tong, on behalf of the 2,000 Chinese Merchants invited to the Electrical Show as guests of Arthur Williams, its president. Mr. Williams was ill at his home at Roslyn, L. I., and heard every word of the greeting at a receiver installed in his library.

Prior to the opening of the regular concert on the night of October 4 a novelty was introduced in the reading of a group of poems by the authoress, Juanita, a local celebrity of the Greenwich Village colony. The feature artist was Miss Clara Eleanor Sanchez, famous operatic soprano from Mexico, the prima donna, who sang opposite Caruso in his post-season of opera at Mexico City. She rendered four operatic selections. Charles D. Isaacson, Director of the Musical Department of the Evening Mail, made an address, "Face to Face with Verdi." J. Kempner, violinist, played two solos. A saxaphone solo followed and three popular songs were sung by Billy Gripps with piano, saxaphone and violin accompaniment. The programme ended with banjo selections by Gus Smith and Tom Higgins.

On the evening of October 5, Johan Van Bommel, noted Dutch baritone, formerly of the Royal French Opera and now soloist at St. Patrick's Cathedral, was the feature of this evening's concert. He sang the Prologue from Pagliacci, MacSady's "Internos," MacGill's "Duna" and as an encore, Medham's "Four Ducks on a Pond," Miss Marie Peyer at the piano. The well-known 'cellist, Gdal Salesski, then played four selections which was followed by two piano selections, Mendelssohn's "Venetian Boat Song" and Mozart's "Sonata," played by Gustav Lindgren. John R. Brierley, tenor, rendered Huhn's "In Victis," and Sanderson's "Thank God for a Garden." David R. Cunnison then followed with Liszt's "Second Hungarian Rhapsody," on the piano. By request of the listeners of previous nights, Gus Smith of the "You Know Me, Al" company, played three popular airs on the banjo and the programme concluded with an invitation to officers and men of the battleship fleet to attend the Electrical Show, delivered by Walter Neumueller, treasurer of the show company.

Navy Day was observed at the Electrical Show on October 6th and hundreds of sailors from the battleships and destroyers then at anchor in the Hudson River, visited the radiophone station to personally express their appreciation for the daily baseball reports and the excellent musical programmes of the preceding evenings.

The programme on the evening of October 6 was featured by the singing of a great artiste, Mlle Bertha Erza, French Algerian dramatic soprano, who rendered "The Prayer" from La Tosca and Massenet's "Le Cid," responding to insistent demands for an encore with two songs in English. Leonard Liebling, of the "Musical Courier," then made an impressive address on the dissemination of the best music by radiophone. A word of greeting to the listeners was also given by Miss Anna Fitzhu, of the Chicago Opera Company, who was present among the spectators in the radio room. The Knabe-Ampico reproducing piano was then used for two selections, with interpretative comment by Miss Rose Roden. The selections were Liszt's "St. Francis Walking on the Waves" and Mendelssohn's "On Wings of Song," played by G. Aldo Randegger. The evening concluded with the customary popular songs by Billy Cripps and the "Poet and Peasant Overture," played as a banjo solo by Gus Smith.

Mme. Helen Stanley, noted operatic and concert soprano, was the feature of the evening of October 7, her selections following an address by Mr. Isaacson entitled, "The Double Miracle," emphasizing the value of the co-ordination of radio with music. Mme. Stanley sang "Micaela" from Carmen, "Un bel di," from Madame Butterfly, "My Love Is a Muleteer," Brahm's "I Passed By Your Window," and Parker's, "The Lark." She shared honors with Mr. Fred Patton, basso, who rendered, Polloni's "Fu Dio lehe Disse," the "Bedouin Love Song," Penn's, "Sunrise and You," Moss' "The Floral Dance," and as an encore "The Road to Mandalay." Miss Betsey Lane Shepherd, soprano, famous for her rendition of heart songs, sang, "The Road of Looking Forward," Curran's "Sonny Boy" and "The Want of You." The programme concluded with violin and piano selections from popular songs played by Kinsetto Mafaraci and Albert Hettinger, two blind boys who are members of the radio club organized by the New York Guild for the Blind.

On Saturday, October 8, the final day of the show and consequently the radiophone concerts, the feature of the evening programme was Miss Marguerite White, well-known concert soprano, who sang "Caro Nome" from Rigoletto, Liszt's "Quandje dors," Rossini's "La Danza" and Rimsky-Korsakoff's "Hymn to the Sun." The high spot of the series of concerts was then reached by the appearance of Maestro G. Aldo Randegger, distinguished operatic composer, who played the piano in person as a member of the Italian Trio, with Aldo Ricci, violinist, and Luigi Zavalloni, 'cellist. They rendered six selections, novelties in chamber music by Italian composers: "Andante alla Marcia" and "Scherzo," by Ricordi; "Andante" and "Allegro Marziale" by Pirani; "Idyl" and "Country Scene" by Lucietto.

At the conclusion of the musical programme, a novelty in radio was introduced in the form of the presentation, by radiophone, of the silver cup, emblematic of the American Championship in code speed reception, to the winner, B. G. Seutter, of the New York Times. J. Andrew White, on behalf of the National Amateur Wireless Association, made the presentation speech by radiophone, and Mr. Seutter replied with an appreciative acknowledgment of the receipt of the trophy.

This concluded the formal series of entertainments, but a half-hour of dance music was played at the request of the Get-Together Boat Club of Goose Creek, L. I., whose members danced fox-trots and waltzes played by Tom Higgins on the banjo, with piano accompaniment.

In addition to the broadcasting of music and speech during the evenings, the World's Championship baseball games between the Giants and the Yankees was described, play by play, by voice, over the radiophone, and each evening a summary of the games together with a digest of the baseball news was broadcasted by voice immediately preceding the regular musical programme.

During the afternoons before and after the broadcasting of the baseball scores, music was broadcasted by means of a phonograph, a large number of records having been contributed for the occasion by the Kay Talking Machine Company, 97 Chambers Street, New York.

One of the most interesting features of the broadcasting arrangements was the provision made for spectators in the radio room during the concerts. A total of some 1,600 people visited the room and they broke out into spontaneous applause at the conclusion of each numbers.

The microphones used for transmission of the voices of the singers, and the music of the instruments were kept in circuit following the various numbers of the programme and the applause of the audience, which numbered between two and three hundred people each evening, went out over the air and judging by the reports of the listeners was a very interesting and humanizing note in the various performances.

Johan Van Bommel, noted Dutch barritone, formerly of the Royal French opera and now soloist at St. Patrick's Cathedral, sent his voice in classic music through the air by means of the radiophone to the enjoyment of thousands

Through the courtesy of G. E. Burghard, president of the Continental Radio and Electrical Corporation, a receiving station with loud speaking Magnavox, was installed at the Knabe Studio, Fifth Avenue and 39th Street. Audiences were gathered there by The Evening Mail and filled the studio to its capacity on several of the evenings. The radiophone transmitter which was used in broadcasting at the Electrical Show, was one which was built specially for the purpose by the Radio Corporation of America. It employed one 250-watt oscillator, one 250 modulator, and one 50-watt speech amplifier. The set was installed on the Drill Room floor of the 101st Field Signal Battalion, located on the fourth floor of the Armory building. The location of the set in respect to surrounding structures, was not all that might have been desired, but surprisingly good results were obtained as is testified to by the great number of appreciative letters which have been received by the National Amateur Wireless Association. A temporary call, 2BZL, was assigned to the station by Radio Inspector Batcheller. The antenna for the station was swung from one of the windows of the 13th story tower of the Armory to an adjoining high point of the building. The wavelength of the station was approximately 200 meters and the antenna current 5 amperes.

The following comments are typical of hundreds which have been received:

"Enjoyed all the concerts by your artists. Voices were clear and distinct. Thank you for the entertainment."

"I have enjoyed your nightly concerts very much; also the baseball reports. I received everything perfectly on a 12 foot aerial."

"The music and other entertainment received via radio is a veritable treat and has been thoroughly enjoyed by myself and friends. Modulation could hardly have been improved upon. I must confess I am very enthusiastic about it."

"This will acknowledge my appreciation of your efforts and the entertainment via radiophone as heard by me clearly and distinctly through interference. I heard every word spoken and every note sung; also heard the applause by the audience. There can be no question but what your radiophone is perfect."

"Heard your concert twenty feet from the phones with single tube receiver. Modulation left nothing to be desired. Concert enjoyed by three other members of my family who listened throughout the entire programme."

"The music could be heard all over a two-family house on a loud speaker of my own design."

"There were eight persons listening in and all enjoyed it very much, but we want more of it. Hearty congratulations."

"Heard you clear as a bell and without antenna or ground can hear you all over the house. You should be heard in England!"

"Your concert tonight could be heard in other rooms and I could hear the applause with a detector only."

"Best concert ever put on the air by anyone. I received it on the bell wiring in my home, used as an aerial, and heard it 50 feet from the phones with one step."

In addition to the radiophone station, the National Amateur Wireless Association conducted an Open-to-All Continental Code speed contest on the evening of September 30th, and a Jamming Contest for amateurs only in the afternoon of October 1.

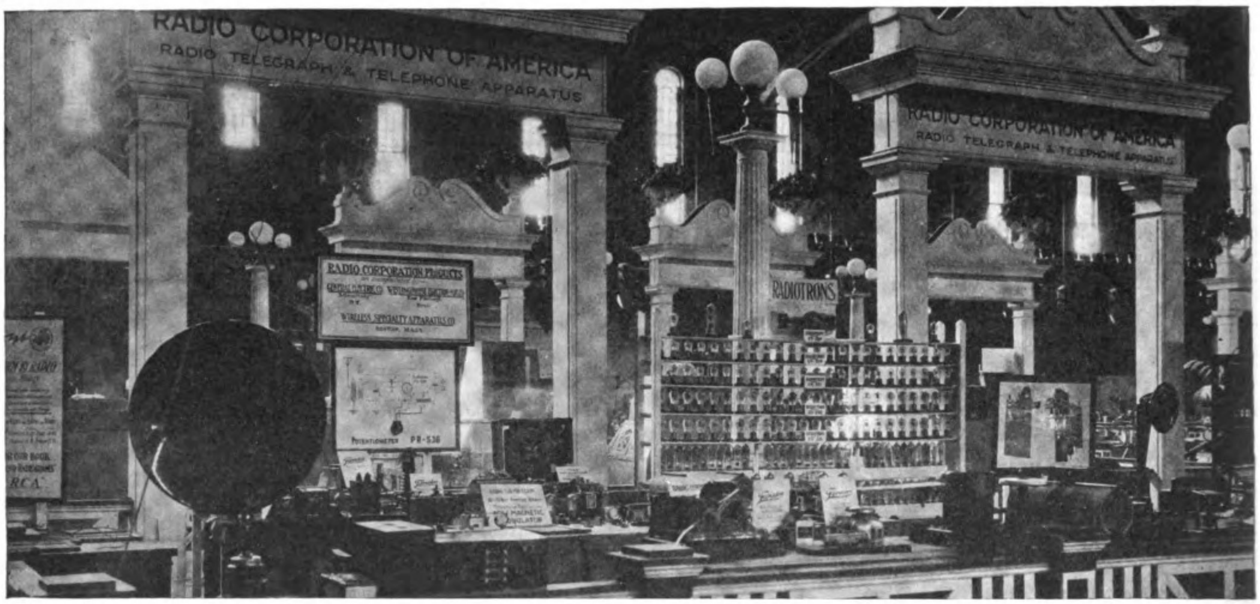
B. G. Seutter, wireless operator of the New York Times radio station won the code speed contest at a speed of 44 1/3 words a minute for two minutes with no errors. George C. Otten of the Radio Corporation of America, trans-Atlantic service, was second with two errors, and Jose Seran, Radio Corporation, was third with four errors. There were thirty-nine entrants, but only twelve qualified for the finals; the minimum speed for entrants to the finals being forty words per minute. In the final contest the twelve were started off at a speed of forty words per minute and gradually eliminated until only four were left. When a speed of 44 1/3 words per minutes was reached it was found that Mr. Seutter was the only operator who had made perfect copy, and he was accordingly declared the winner. Mr. Seutter was presented with a large cup suitably inscribed, which was donated by the Edison Company.

The apparatus used in this speed code contest was of a new and improved type in that a special circuit for the purpose was designed by Paul F. Godley of the Adams-Morgan Company for the occasion. Instead of a buzzer ordinarily used in such cases, a vacuum tube oscillating at an audio-frequency was employed, thus insuring stability of tone and avoidance of confusion to the operators by dis-continuous signals or change of tone of the signals, which sometimes occurs when a buzzer is used.

The judge of the contest was Arthur Batcheller, Radio Inspector of the Second District, aided by his assistants, Mr. Bean and Mr. Lee.

The Jamming Contest, open to bona-fide amateurs only, was won by a well known amateur of the Second District, B. B. Jackson, 34 East Newell Avenue, Rutherford, N. J., whose call, 2EX, is a familiar one.

In this contest, straight matter was transmitted on a circuit and twelve operators copied at one time. Interfering signals were then transmitted on the same circuit and as Mr. Jackson succeeded in making the most perfect copy through this interference he was awarded the prize of six Radiotrons, Type UV-202, donated by the Radio Corporation of America.



The interesting and unusual exhibit of radio apparatus displayed by the Radio Corporation of America attracted the attention of most of the visitors throughout the ten days of the Electrical Show

Mr. Jackson has long been identified with amateur radio activities. He started in 1908 with an auto-coherer progressing through the various stages of crystal detectors to vacuum tube reception. He began the transmission three months after becoming interested in radio in 1908, using a spark coil. He is a member of the Rutherford Radio Club and one of the most advanced members of the Second District.

E. Laufer, 699 East 137th Street, New York City, 2AQP, was the runner-up in the Jamming Contest.

One of the most interesting and unique exhibitions of radio apparatus in recent years was that staged by the Radio Corporation of America.

The most popular item was a complete display of the Radiotron and Kenotron Vacuum Tube series. These are the tubes which today make possible the operation of radio telephone and telegraph transmitters with marked effectiveness by the amateurs of the United States.

Two complete amateur vacuum tube radio telephone and radio telegraph sets were installed on separate tables in the exhibit in diagrammatic form; in other words, so placed and wired that every connection could be plainly seen by having the connectors in various colors. In this manner, even the beginner could readily see at a glance how each instrumnt contributed to the proper functioning of the entire circuit. These two sets consisted of a 100-watt amateur C. W. radio telephone and telegraph set using two 50-watt Radiotrons and two 150-watt Kenotrons and employing the new magnetic speech amplifier. This latter instrument is one of the most important inventions brought forth in the field of radio telephony during the past year and permits the amateur to have a thoroughly reliable means of modulating the antenna oscillations of any low power radio telephone set.

The other and smaller set was a 10 to 20-watt radio telephone set employing four of the five watt Radiotron tubes.

A 2 K. W. marine transmitter built by the General Electric Company for the Radio Corporation of America for its marine equipment was also at the exhibition. This panel type transmitter incorporates the use of wavelengths from 200 to 800 meters and employs a synchronous rotary as well as a quenched spark, either method easily interchangeable by means of a hand control switch. This type of transmitter has proven very efficient and is the one that is being used at present on board the greater part of American vessels.

Another interesting phase of the Radio Corporation exhibits was the transoceanic or high power service which is now available to the New York business man. A representative of the corporation explained the features of the "Via RCA" method of sending messages to Europe and explained by means of photographs and booklets the work of the various high power transmitting and receiving stations contributing to the success of World Wide Wireless.

Selective Receiving Circuit

An oscillatory circuit in which interference can be counteracted without changing the resonant frequency of the circuit, has been described by T. M. Libly. This is accomplished by connecting two reactances in parallel and adjusting one of them for zero value at the resonant frequency of the oscillatory circuit in which the interfering signal current flows. The parallel reactances are then connected in series with the oscillatory circuit and the parallel reactances in series with each other are adjusted for zero value at the frequency of the interfering signal current.

Previously this was accomplished by connecting the parallel reactance in series with the oscillatory circuit in order to adjust the parallel reactances in series with each other for zero value at the frequency of the interfering current, and then to adjust the reactance of the oscillatory circuit so that the reactance of the oscillatory circuit in series with the parallel reactances will be zero at the frequency of the signal current selected for reception or amplification by series resonance.

Figure 1, with switch 1 thrown to the right, represents a complete radio receiving system. The reactances of the antenna circuit and the secondary oscillatory circuit are made zero at the frequency of the waves of the signal selected for reception.

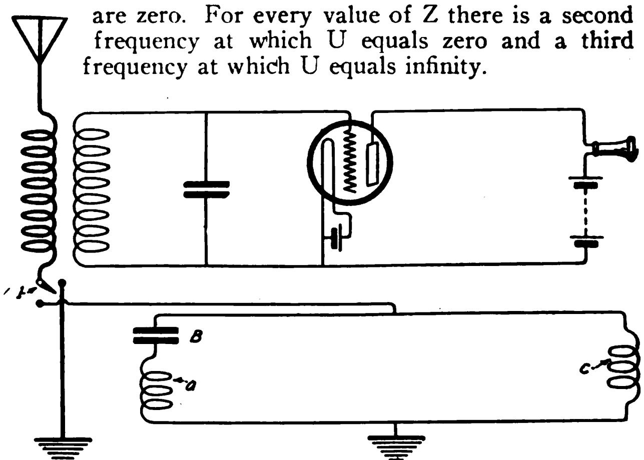
When an interfering signal wave impresses an electromotive force of a difference frequency upon the antenna circuit the reactance of inductance A and condenser B in series is made equal to the reactance of the antenna circuit at resonant frequency and then switch 1 is thrown to the left. The inductance C is then adjusted until the reactance of inductance A, condenser B, and inductance C in series, is zero at the frequency of the interfering impressed electromotive force. In figure 1 it is assumed that the frequency of the interfering e.m.f. is less than the frequency of the impressed e.m.f. due to the signal selected for reception. Parallel resonance is attained in the circuit A, B, C, when the interfering current in the antenna circuit is a minimum.

For convenience let the reactance of the antenna circuit be represented by X when switch 1 is thrown to the right. Let the reactance of inductance A and condenser B in series be represented by Y and let the reactance of inductance C be represented by Z. Then both X and Y are zero at the frequency of the waves of the signal selected for reception and Y plus Z equals zero at the frequency of the interfering waves. The word "frequency" refers to the quantity, which is inversely proportional to wavelength or length of the waves.

The total reactance of X in series, with Y and Z in parallel, will be represented by U which is expressed mathematically by the equation,

$$U = X + \frac{YZ}{Y + Z}$$

from which it is seen that U is Zero when both X and Y are zero. For every value of Z there is a second frequency at which U equals zero and a third frequency at which U equals infinity.



Circuit diagram of the selective receiving system

The parallel reactance Y and Z in series, when connected in series with X, will be designated the parallel resonance circuit. The circuit A, B, C, is the parallel resonance circuit in figure 1. The reactances of the series resonance circuit is either X when the switch is thrown to the right or U when the switch is thrown to the left. The parallel resonance circuit constitutes an infinite reactance to current through X having the frequency at which parallel resonance takes place.

This method of introducing parallel reactances is an improvement on the present method which is equivalent to throwing switch 1 to the left, adjusting Y plus Z for zero reactance at the frequency of the interfering current ,and then adjusting X so that the reactance U will be zero at the frequency of the selected signal waves. This method interrupts reception, and reactance X cannot be graduated for wavelength since X will have different values when U equals zero.

Efficient Home-Made Coupler

By DeWitt H. Thompson

SOME time ago I built a small loose coupler and the results obtained with it have been so far beyond my expectations that I thought perhaps the other members of the N.A.W.A. would be interested in hearing about it.

The base of the coupler is but 2½ inches wide by 8 inches long, and the height over all is 2¾ inches. The wood used in its construction is cigar-box wood, sandpapered down, stained and shellacked.

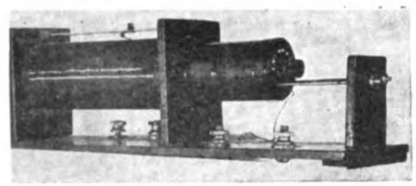


Figure 1—The "baby" loose-coupler

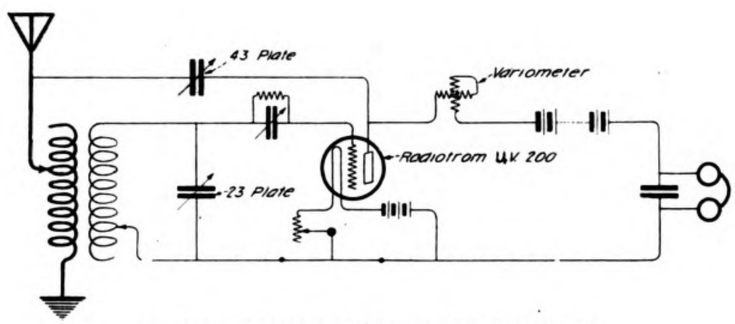


Figure 2—Diagram of the coupler-receiver circuit

The primary consists of a winding of No. 28 enameled magnet wire, on a hard rubber tube, having an outside diameter of 1⅜ inches. This tube is 3¾ inches long and the winding takes up 3 inches. The slider is a small piece of phosphor-bronze and slides on a piece of a bicycle spoke, having a small nut soldered on each end to hold it in place.

The secondary tube is of hard rubber also, and was made from an old Swedish-American telephone receiver. This tube is one inch in outside diameter and 3¾ inches long. The winding which takes up 3 inches consists of enameled magnet wire taken from an old "Ford" spark coil secondary, and has eight taps taken off. This winding is shellacked to hold it in place. The switch points for the secondary switch are small round-head nails. The switch knob is made from a piece of 5/16 inch hard rubber rod and a small machine screw, 6/32. A tiny phosphor-bronze switch lever is fastened to this by means of two flat 6/32 hexagonal nuts. The rods supporting the secondary are portions of bicycle spokes. The nuts on one end of the spokes are portions of nipples and small nuts are soldered on the opposite ends. The clearance between the primary and the secondary is very small, being just sufficient to allow the secondary to slide into the primary without rubbing. This tiny coupler is interesting as a novelty and especially so when it is demonstrated that it is an efficient instrument.

The outer winding of the variometer used in connection with the above described coupler consists of about seventy turns of No. 28 enameled magnet wire on a piece of cardboard tubing 3¾ inches in outside diameter with a ⅛ inch wall and 1¾ inches in height. The inner winding consists of about seventy turns of No. 28 enameled magnet wire wound on a cardboard form 2½ inches outside diameter and 1¾ inches high. A portion of the cardboard casing from a No. 6 dry cell was used in my case.

The cardboard tubes were paraffined and the windings sewed in placed with a needle and thread.

The variable condenser connected from the aerial to the plate of the V.T., forming a "capacitative tickler," should be so arranged that it may be cut out, if desired, for occasionally a station is found that comes in better without it. Most stations, however, come in the best when both the "capacitative tickler" and the plate variometer are in use. The adjustment of this outfit is rather critical but once it is properly adjusted the "sigs" roar in. I have had NAJ coming in loud enough so that I could lay the phones down on the table and hear the "sigs" when standing several feet away, which is more than I have ever been able to do here with any other outfit or hook-up and a single V.T. I get the best results by setting both variables at zero and tuning with the primary slider, the secondary switch, and vary the coupling and the variometer. Some adjustment of the plate voltage and the filament rheostat may be necessary. Experiments with this hook-up in connection with various couplers indicate that it will work quite well with almost any coupler on wave-lengths from 600 to 800 meters, but

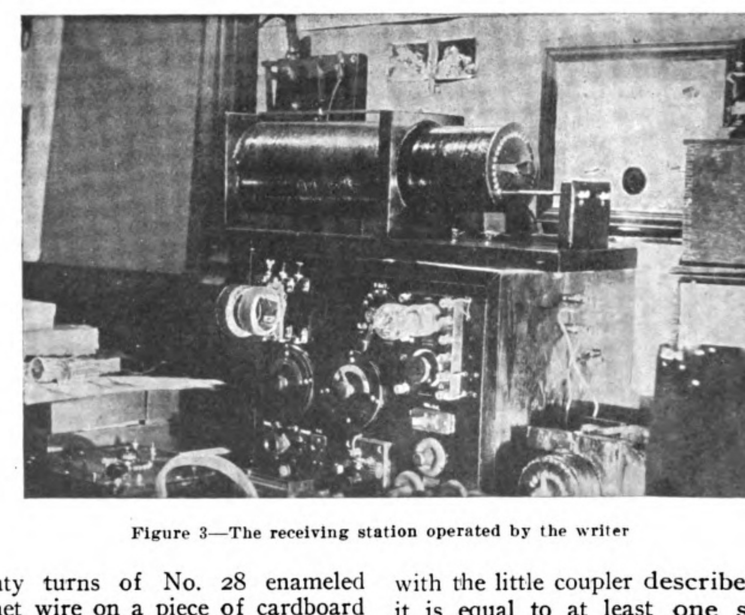


Figure 3—The receiving station operated by the writer

with the little coupler described above it is equal to at least one stage of amplification. Should any of the N.A.W.A. members wish to build such a set I will gladly take up with them, personally, any points which may not be quite clear if they will write to me concerning the matter and enclose a stamp for reply. Address all letters to The Wireless Age.

Transmarine Radio Telegraphy

A SYSTEM of trans-marine radiotelegraphy has been disclosed by Walter Hahnemann, of Kiel, Germany. This system may be employed on stations one or both of which are located on shore or on ships at sea, wherein the elements employed for radiating the electrical energy are disposed below the surface of the water, and the radiotelegram is transmitted through the water.

In other systems of radiotelegraphy it is customary to have the antenna disposed high above the station. This, however, has proved objectionable in that the vital part of the system is exposed and if destroyed the result is that the entire system is temporarily disabled and this is particularly true with respect to naval vessels involved in a naval engagement, inasmuch as the aerial tower is in such a position as to be easily and quickly destroyed.

It is now proposed to eliminate the various disadvantages mentioned with respect to the trans-marine radiotelegraphy systems now in use, and to provide a system 3×10^8 vibrations in a second because as calculation shows, at this frequency the specific resistance is already approximately equal to the specific reactance. Thus it will be understood that for carrying out this idea it is only necessary to apply to the ship a generator which generates frequencies of the order and magnitude stated.

If the station or ship be provided with an alternating current generator having its current frequency so gaged as to cause the reactance of the sea water, to be equal to or smaller than the ohmic resistance of the medium, then it will be possible to transmit radiotelegrams through the water as they are now transmitted through the air. The generator to produce proper results must, it is found, produce a current having a frequency greater than 3×10^8 per second. In this connection it is to be understood that the radio energy is transmitted to the water by suitable radiating elements arranged for instance on the bottom of the ship, while on the receiving station, which may be

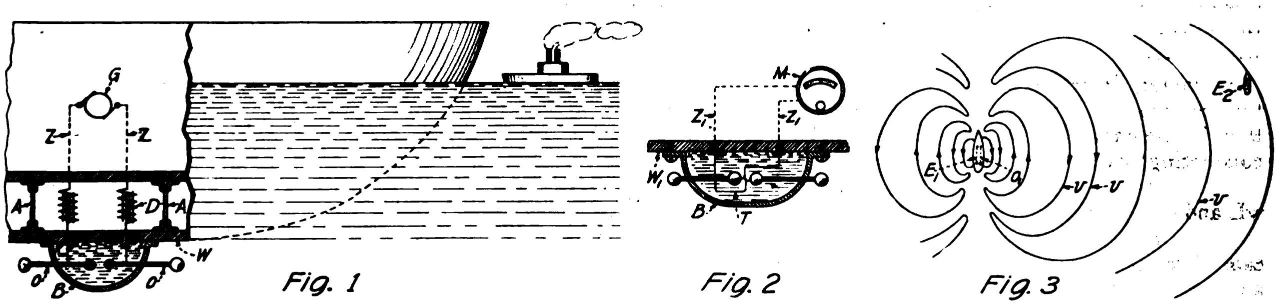


Figure 1—Transmitter. Figure 2—Receiver. Figure 3—Diagrammatic representation of transmitter and receiver on same ship

in which the antenna is disposed below the surface of the water and consequently comparatively free from destruction, which thus makes it impossible to cripple the system by damage to the antenna. The difficulty, however, which has prevented the practical use of underwater radiotelegraphy has been due to the fact that the usual frequencies of the electrical source utilized in connection with the ordinary systems of radiotelegraphy cannot overcome the ohmic resistance of the sea water. Furthermore it is well known that the relation of the ohmic resistance to the capacity reactance plays a part, insofar as with rising frequency in general the value of the relation of the latter sinks with respect to the ohmic resistance. If therefore, it is possible to make the capacity reactance equal to or smaller than the ohmic resistance, then communication under water by means of electrical waves is possible.

It will thus be seen that by an increase in the current frequency it is possible to diminish the reactance of the conducting medium to an unlimited extent, the ohmic resistance being dependent on the frequency of the current. Hence the higher the frequency, the smaller becomes the reactance and consequently a much greater part of the electric energy is transmitted by dielectric displacement and is no longer subjected to losses of energy by ohmic resistance.

As the loss of energy is considerably lessened in the case of dielectric transmission a considerable increase in range is obtained in the case of transmission by pure current conduction, presupposing that success is obtained in radiating considerable quantities of energy in the form of very short waves.

The gist of this system resides in the fact that the frequency of the electric current is so calculated that the reactance of the medium, that is the sea water, becomes equal to or less than the ohmic resistance of the medium. This requirement is obtained owing to the fact that the frequency adopted for use is selected at not less than another ship, a corresponding receiver is arranged, which absorbs the radio waves and transmits them to a detector suitable for frequencies of the above-mentioned magnitude.

In the accompanying illustration an arrangement is shown including a transmitter housed in the double bottom of a ship preferably between two beams A, and comprises two radiators, O, O, formed in accordance with the Hertz oscillators having one of their ends disposed in a receiver B, filled with petroleum P, and with their other ends extending into the water outside. The oscillators O, are connected to the generator G, by the lead-in or conducting wires Z, which pass through the ship's bottom W, and are surrounded by suitable insulation at their points of passage through the bottom. Between the radiators O, O, which serves as electrodes, there passes a luminous arc which generates very high frequency waves after a manner of the well-known Dudell phenomenon. In the conductors Z, there are formed large chocker spools D, for the purpose of preventing an overflow of waves to the generator. In case the ship is already provided with a conduction net-work of sufficient high tension, say about 500 volts, the transmitter device may also be connected in the same, or a suitable transformer may be used.

The receiving device shown in figure 2 is similar to the transmitter and has disposed below the bottom of the ship W, electrodes E, similar to the oscillators of the transmitter. These electrodes have one of their ends disposed in a receiver B, secured to the bottom of the ship and filled with petroleum while their other ends project into the water. Between the ends of the electrodes which are arranged in the petroleum receiver there is provided a thermo-element T, connected with a galvanometer M, by the conductor Z, which extend through the ship's bottom and have insulating material arranged around them at the points where they pass through.

It is to be understood that both the transmitter and the receiver may be arranged on the same ship if desired, as is shown diagrammatically in figure 3. The waves V, sent out from the transmitter O, spread out into the water in the form shown in figure 3, and as soon as they reach the receiver E, may be recognized by the deviation of the galvanometer connected with it.

The principle upon which this system operates may be more readily understood by referred to Ohm's law for alternating current which is represented as follows:

$$J = \frac{E}{\sqrt{W^2 + \left(wL - \frac{1}{wC}\right)^2}}$$

In this equation

$$\sqrt{W^2 + \left(wL - \frac{1}{wC}\right)^2}$$

denotes the impedance which a tension E, has to overcome to produce a current J. The value w, is the product of 2π, and the number n, of quiet oscillations per second. If the conducting path is of such a nature that the current does not produce a magnetic field, then L will be zero.

However, if the conducting path is of such a nature that no amount of electricity can remain quiet upon it, then C, the capacity, is equal to zero. That is to say, the conducting path is capacity free. In these cases the values wL and $\frac{1}{wC}$ of which the first means the inductance caused by self-induction, while the latter denotes the reactance caused by capacity can be considered fallen away or disappeared. The self-induction L, and consequently the value wL, of the foregoing equation does not now come into question. The ohmic resistance W is, as is apparent from the equation, absolutely independent of the value $w = 2\pi n$ of the alternating current. The reactance $\frac{1}{wC}$ of the equation, however, which as stated above, also possesses the characteristics of a resistance, is directly dependent upon the magnitude of the capacity C, as well as upon the magnitude of the value W, and in such a manner that this value will become less when the capacity increases and also when the frequency rises. In the above cited example it will be seen that we only have to observe now

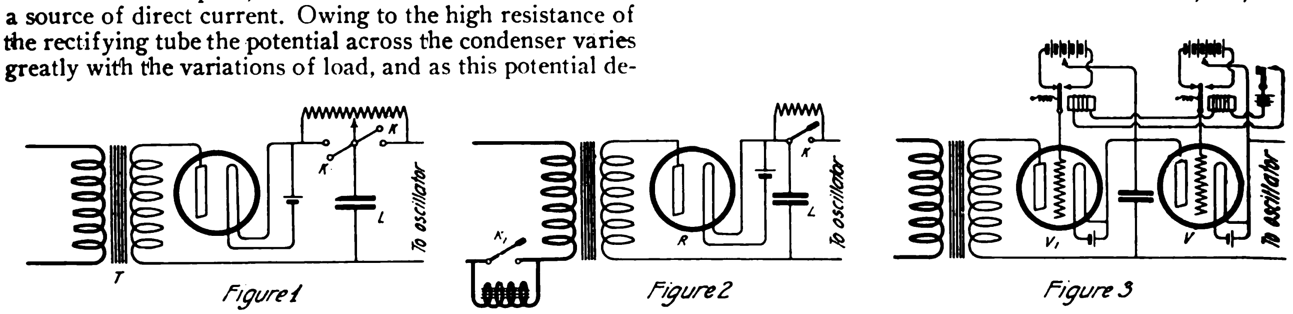
$$J = \frac{E}{\sqrt{W^2 + \left(\frac{1}{wC}\right)^2}}$$

in which the values W and wC remain constant. If one now considers the relation of the values W and wC, it will be found that the value of $\frac{W}{wC}$ falls with the rising value of w. Obviously, one can consider in a conducting medium capable of great all around expansion in all directions and a high dielectric constant, that an alternating current can be divided into two currents, one of which is propagated through ordinary conduction while the other would propagate itself similar to the manner in which an alternating current would pass through a condenser filled with an insulator. For the first named current the value W is controlling for the magnitude of resistance, and for the last named current it is controlling for the value $\frac{1}{wC}$. In $w=2\pi n=O$, the value $\frac{1}{wC}$ becomes infinite. It will thus be seen that with a very high n, and also a very high w, the value of $\frac{1}{wC}$ when compared with the value W is very small.

It naturally follows that in a rising frequency more and more current must spread out on the last mentioned path and furthermore, the more current spread out, the smaller the value of the equation. However, inasmuch as in this spreading out process much smaller losses arise than with the ordinary conducting path (due to absorption), it naturally follows that with the rising frequency, all other conditions being equal, the wave spreading must become better.

A Switching Device for Tube Circuit

A RADIO transmitter using current from an alternating source which is rectified and then smoothed out by a condenser has provision for the oscillator, whether tube or spark, to be worked off this condenser as a source of direct current. Owing to the high resistance of the rectifying tube the potential across the condenser varies greatly with the variations of load, and as this potential determines the signal strength in the case of a spark set, and both the wave-length and signal strength in the case of a tube set, it is very desirable that this potential be kept constant. A method of accomplishing this by simultaneously opening and closing the circuits supplying current to the condenser and from the condenser to the oscillator, has been developed in London by H. J. Round and W. T. Ditcham.



Switching system for an A. C. source to develop D. C. supply

In figure 1, T is an alternating current transformer which delivers high tension current to a rectifying tube. L is a blocking condenser of large capacity which smoothes out the current to the oscillator. K, K^1, are two arms of a key or switch that open the circuits simultaneously, whereby the potential of L remains constant. In some cases the two arms of the key are shunted by resistances so that the transmitter is kept feebly oscillating even when the key is open. The resistances are so adjusted that the potential of the blocking condenser remains constant.

In the modified arrangement shown in figure 2, the arm K opens the circuit of the oscillator as before, but the arm K^1 of the switch opens the main circuit. Here again the arm K may be shunted by a resistance and the arm K^1 by a choke coil which are so adjusted that the condenser L remains at constant potential.

Figure 3 shows an arrangement in which the opening and closing of the circuit on the two sides of the condenser are affected by the three-electrode tubes V and V^1 the grids of which are connected to the armatures of two relays arranged in circuit with a key, the opening and closing of which cause the energization of the relays whereby the grids of the two tubes are simultaneously connected to corresponding ends of batteries and are made positive and negative with respect to the filaments so that the circuits on the two sides of the condenser are opened and closed.

Panels for Receiving Apparatus

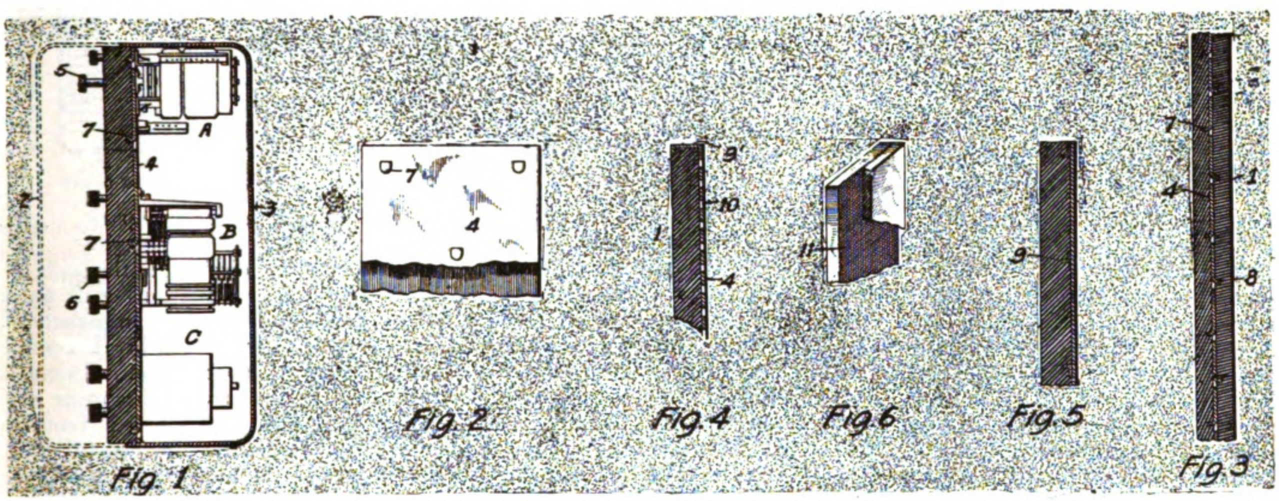
ELECTRICAL radiation, comprising electrostatic and electro-magnetic components originating in electrical machines and apparatus which may be in the vicinity of receiving apparatus, permeates the surrounding medium and sets up erratic disturbing effects which interfere with the proper operation of the receiver.

A panel has been designed by I. H. Mills and G. B. Crouse which they claim effectively shields the instruments by combining a metallic screen with the panel or board upon which the instruments are mounted. The stray electrical radiation is thus prevented from passing through the panel and is absorbed or reflected before reaching the instruments. The metallic screen also forms a mechanically stiff and rigid structure to support the panel.

Referring to the drawings, 1 designates an instrument panel used in radio receiving. A front and back metal cover 2 and 3 are employed to protect the instruments in use from physical damage or wear and tear. When the radio set is in use the front cover will necessarily have to be removed so that access may be had for adjustment and operation of the instruments. At this time the instruments are subjected to the disturbing effect of electrical radiation which may pass through the panel unless a metal shield is provided. The shield 4 in connection with the metal cover 3 forms a metallic inclosure completely incasing the instruments against electrical radiation.

This screen 4 is applied to either the front or rear surface of the panel. In figure 1 the screen is applied to the rear of the panel and adjacent to the instruments. The instruments are shown mounted upon the back of the panel, and are fitted with the usual form of adjusting screws and knobs which pass through the panel and are available for adjustment from the front side of the panel, as at 5 and 6. The metallic sheet has holes and openings for receiving the parts and fittings which pass through the panel from the instruments to the adjusting knobs on the front. The sheet 4 is secured to the panels by embedding the struck-up portions 7 in the molded material during the process of molding the panel. During the manufacture of the panel the plastic material is shaped in molds and forms and during this process the struck-up portions are pressed into the plastic material before it hardens, thus securing the plate 4 firmly to the molded panel.

Figure 3 and the remaining views illustrate various ways of combing the metal screen with the panel. The panel itself is usually molded of a selected insulating material such as bakelite dilecto, micarta and the like. The metal sheet, perforated plate, or gauze material may be combined with the panel during the manufacturing process and placed within the panel form prior to introducing the insulating material in the liquid or plastic state into the mold or form. When the material is hardened and removed from the form the metal sheet will be embedded in the panel and become an integral and strengthening embodiment with the panel construction.



Details of screening panel for receiving apparatus

Another method of combining the two materials is to form the projections or struck-up portions on the screen or the plate punching up portions on the metal, as indicated by 7 and 8. These projections may be turned out on both sides of the plate and then molded into the mass of material and totally incased therein as shown in figure 3. In this way the plate may be secured within the panel. Angle members 9 may be secured to the screen and incased in the molded material, and likewise the edges of the shield or screen may be turned up and become fixed in the mold of the panel as indicated at 9 and 9′ in figures 4 and 5. Perforated or gauze screens 10 and 11 may also be employed to advantage in a panel as shown in figures 4 and 6.

This panel forms an effective shield and barrier to all stray electromagnetic and electrostatic fields, and thus may be employed as a receiving panel in radio telegraphy, telephony or in other apparatus where conditions are similar.

High Frequency Oscillations from a Buzzer or Rotary Wheel

A NOVEL method of producing high frequency oscillations for use in wireless telegraphy has been disclosed by F. Cutting, who calls it a simple form of apparatus for periodically exciting a discharge gap and condenser circuit so as to produce groups of high frequency oscillations.

The high frequency oscillations are set up in the oscillation circuit which is coupled by a transformer to a discharge circuit. The discharge circuit contains a condenser and a cooled quenched gap. The condenser is fed by a feed circuit which contains a source of electromotive force, such as a direct circuit generator, an inductance, and a sending key. A circuit containing a make and break device is connected in shunt with the spark gap. In figure 1, the make and break device is a rotary make and break while in figure 2 it is a make and break device of the buzzer type. When the make and break device is closed, the shunt

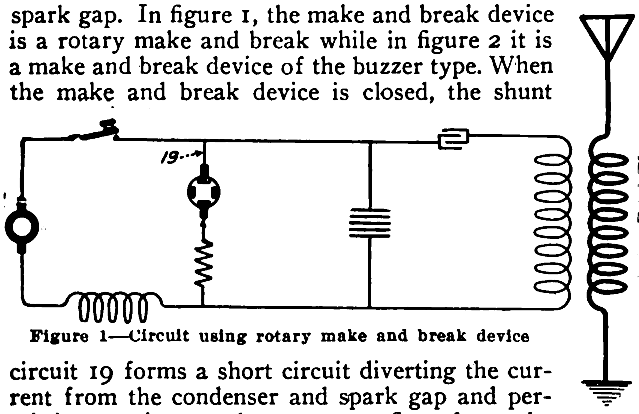


Figure 1—Circuit using rotary make and break device

circuit 19 forms a short circuit diverting the current from the condenser and spark gap and permitting an increased current to flow from the generator through the inductance. The increased current stores magnetic energy in the inductance. When the make and break device breaks the short circuit through the shunt, the current from the generator flows into the condenser which discharges through the gap with the result that high frequency oscillations are induced in the oscillation circuit. When the short circuit through the shunt circuit is broken, the energy stored in the inductance is applied as an added electromotive force for charging the condenser. As the make and break device operates to alternately short circuit the gap and condenser and then break such short circuit, the inductance alternately receives and gives up energy. This tends to equalize the load on the generator. It also permits the system to be worked over a considerable range of electromotive force impressed by the generator because when the make and break device opens the shunt circuit, the inductive kick from the inductance causes an electromotive force to be applied to the condenser which may be higher than the electromotive force of the generator.

The condenser, the spark gap and feed current are so related that for each break of the make and break device, a number of condenser discharges pass across the spark gap. In the system illustrated the oscillations are produced in the antenna circuit by impact excitation. The gap is so constructed and the circuits are so connected that the condenser-discharges across the gap are substantially unidirectional. The make and break device illustrated in figure 1 is simply a wheel with alternating conducting segments and insulating segments which are engaged by contacting brushes. The wheel is driven at the proper speed to continuously make and break the circuit which shunts the spark gap. For proper operation, the peripheral speed of the wheel should be great enough so that with the particular value of the feed current employed, the condenser will not charge up fast enough to reach the voltage which causes sparking at the break. As long as the voltage of the condenser increases more slowly than the voltage which would cause sparking at the segments of the make and break device, the operation is satisfactory. Sometimes a small jump-forward spark will occur at the make, but any injurious effects of such sparking can be cut down by the use of the small resistance in series with the make and break device.

Figure 2 shows the make and break device of the buzzer type. In using the buzzer type the operation is slightly different from that with the rotary make and break. With the buzzer type it is difficult to have the contacts separated with sufficient velocity to prevent sparking at the break. If, however, the contacts of the buzzer are properly designed and are of suitable material, the spark oc-

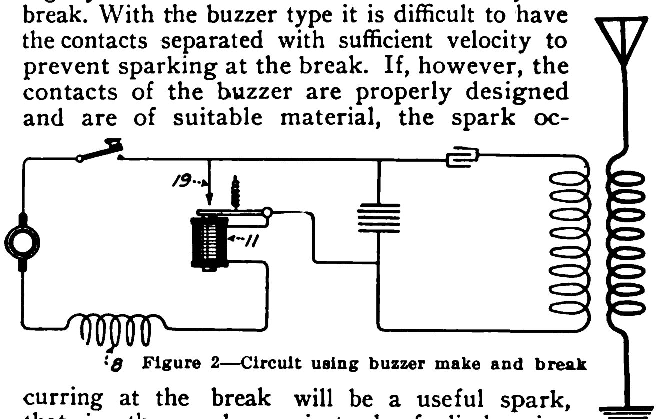


Figure 2—Circuit using buzzer make and break

curring at the break will be a useful spark, that is, the condenser instead of discharging through the gap will at first discharge through the buzzer gap and high frequency oscillations will be induced thereby in the oscillation circuit. In practice it is found that the buzzer type of make and break operates as follows: When the contacts separate, initial sparking occurs at the buzzer gap. When this gap becomes wider than the main gap the sparking is shifted from the buzzer gap to the main gap. This shift has the advantage of relieving the buzzer gap of the load which would tend to overload it. This is particularly important as it is difficult to make buzzers of proper frequency and yet large enough to take care of any considerable degree of power. The shift of the spark from the buzzer gap to the main gap is also advantageous in that the final sparking occurs through a gap whose maximum length is fixed. If the sparking should occur entirely through the buzzer gap without being shifted to the main gap, the gap length would then vary from zero to an undesirable maximum when the buzzer contacts are fully separated. It is found that the quenching properties of the gap decrease as its length increases, so that it is desirable that the sparking be shifted to a gap of predetermined length rather than a gap whose length is variable and increases to an undesirable amount.

The speed of the make and break device can be adjusted to give the desired group frequency to the trains of radiating oscillations. Not only does the make and break device furnish a simple means of producing properly timed groups of high frequency oscillations, but it permits the advantageous use of the energy stored in the inductance in connection with the source of electromotive force, permitting the apparatus to be worked at a considerable range of impressed electromotive force, as the inductance stores energy and tends to raise the voltage applied to the condenser when the make and break device breaks the shunt circuit.

EXPERIMENTERS' WORLD

Views of readers on subjects and specific problems they would like to have discussed in this department will be appreciated by the Editor

Buzzer Modulation vs. Chopper Modulation

By A. Machson

FIRST PRIZE $10.00

IN the prize contest series on "A Chopper for C.W. Transmission," October WIRELESS AGE, the writer described the design and construction of a chopper used to modulate continuous waves. This chopper was specifically built in order to carry out a series of tests to compare the relative merits of chopper modulated C.W. and buzzer modulated C.W. The connections used in these tests and the results arrived at form the subject matter of this article.

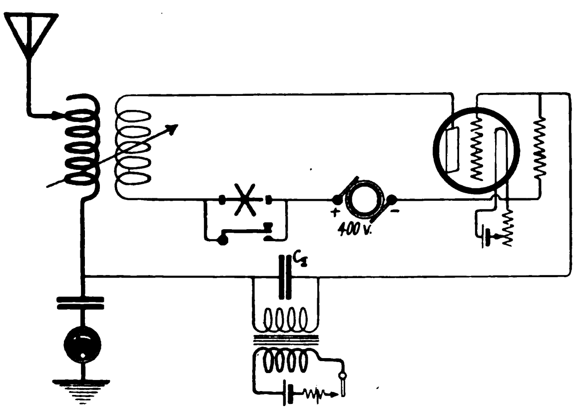


Figure 1—Circuit showing buzzer modulation by grid injection

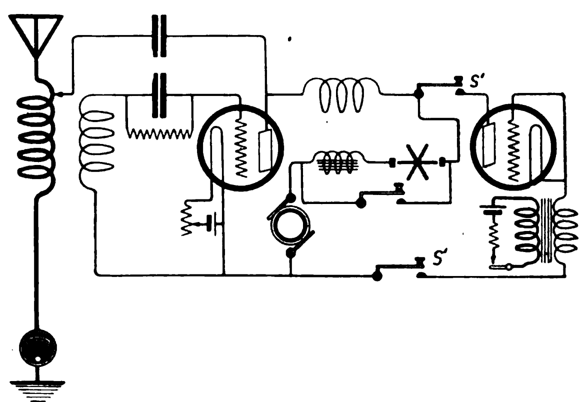


Figure 2—Radio frequency oscillating circuit and Heising system of modulation

In carrying on these tests a bulb transmitter was employed, and to make the results conclusive, two systems of buzzer modulation were used. The first system was that of injecting into the oscillator grid the buzzer signal as stepped up by a telephone transformer. The second system was the so-called Heising system, where a separate modulator tube amplifying the buzzer signal impresses the signal into the plate circuit of the oscillator. In each case the chopper was connected in series with the positive lead of the plate generator, thus interrupting the application of the D.C. voltage on the plates and hence modulating the C.W.

Figure 1 shows the radio frequency oscillating circuit using the first system of buzzer modulation, namely, grid injection. The oscillating system as seen is a very simple one, described previously in the March, 1921, issue of THE WIRELESS AGE, in an article on "Amateur C.W. Transmission" by Felder. The grid condenser Cg is shunted by the secondary of a Western Electric No. 5 induction coil, the buzzer being connected in the primary. A short circuiting switch S is placed across the chopper and an open circuiting switch S is placed in series with the secondary of the induction coil. When using buzzer modulation the switch S is closed, thus throwing the chopper out of circuit, and when chopper modulation is used the switch S is open, thus throwing the buzzer out of circuit.

Figure 2 shows the radio frequency oscillating circuit and the Heising system of modulation. The oscillating circuit was changed as shown, because this is most frequently employed on commercial sets. As in the first method, switches are employed to insert either buzzer modulation or chopper modulation.

The construction of the chopper is described in detail in the article mentioned in the first paragraph. The buzzer used was the standard Century buzzer, as employed on practically all commercial and Navy sets. The general method of carrying out the tests is to use a definite power in the antenna, measured by the current, for both buzzer and chopper modulation. Modulate this power by both methods, and determine the audibility at a receiving station located some distance from the transmitter.

The results of the tests definitely pointed to the conclusion that the chopper method of modulating was about twice as good as the buzzer method as far as range and audibility were concerned, and was far superior to the buzzer method as far as general operation features and control were concerned.

The method of buzzer modulation does not differ in any way from the methods of speech modulation employed in telephone sets. And generally speaking, there are very few sets which are able to boast of complete 100 per cent. modulation, for the simple reason that it is difficult to get the necessary energy from the buzzer or microphone to modulate completely. The very good sets usually reach a value of 75 per cent. maximum modulation, but an average set is considered quite good if it modulates around 50 per cent. With the chopper the case is absolutely and entirely different. With the chopper complete 100 per cent. modulation is always obtained. The chopper simply interrupts the transmission and consequently the antenna current, when it does exist, is always at a maximum. The interruption of the chopper does not affect the antenna current, whereas the modulation of the buzzer does affect it, and generally, since the modulation is less than 100 per cent., the antenna current on the average is less than full value. It will therefore be evident that the chopper will result in a higher audibility and therefore greater range than the buzzer.

When it comes to a question of controlling and operating these two devices for interruption of C.W. we

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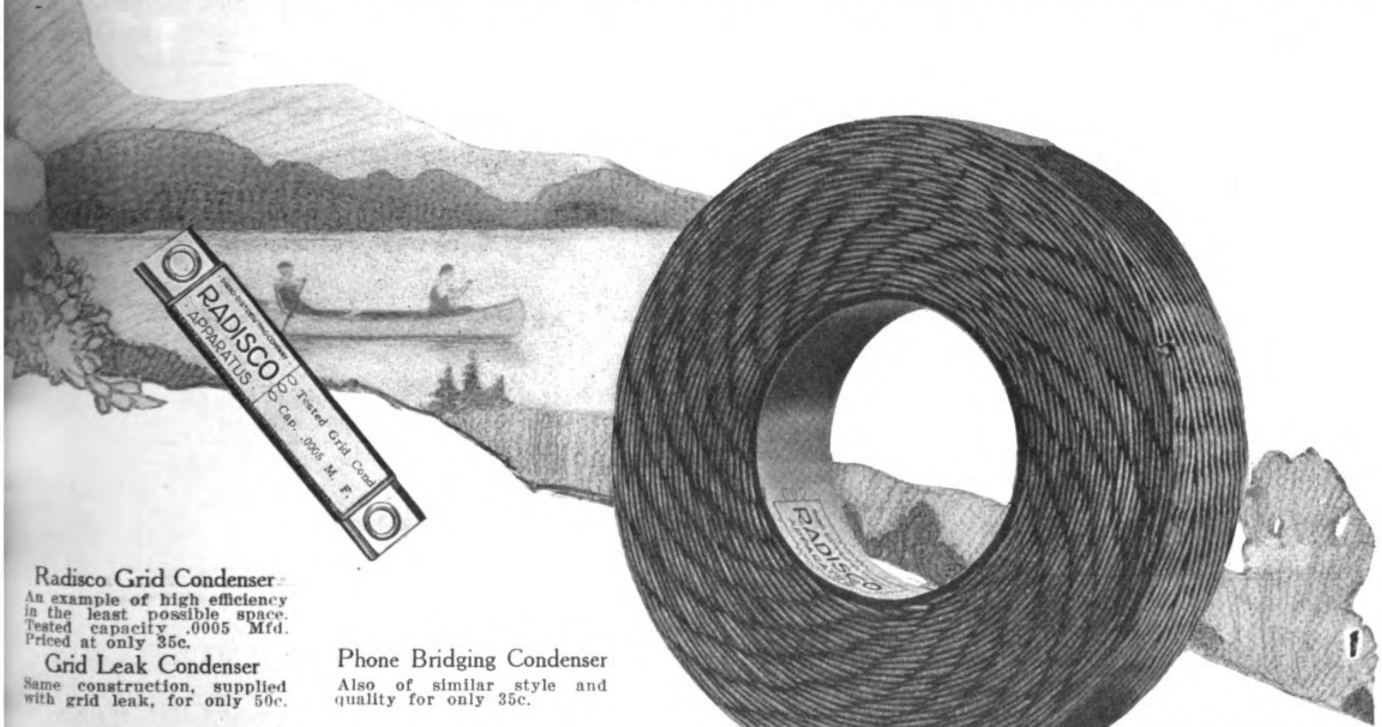

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This Mark RADIO DISTRIBUTING COMPANY RADISCO APPARATUS *Your Guarantee* found in our tests that the buzzer was a very inconvenient piece of apparatus as compared to the simple chopper. In the first place the buzzer contacts would very frequently stick, and therefore continually require adjustment. There are no contacts on the chopper which can stick and require attention. In the second place, and very important from the receiving point of view, the buzzer does not maintain its note constantly. It will change its pitch from moment to moment, and require continuous adjustment of the tension screw to keep a pure steady tone. The man at the receiving end is the one who suffers. The chopper, on the other hand, will keep a steady note. The pitch of its note depends only on the speed of the driving motor, and this can be kept quite constant. Finally it is much easier to change the pitch of the transmitted wave by means of the chopper than by means of the buzzer.

It was found that the buzzer method of modulation employing the Heising system was considerably better than that of figure 1, grid injection. The chopper is better than the Heising system, by the amount stated above and for the reasons mentioned. Now when you consider that the Heising system requires a separate modulator tube, buzzer, telephone transformers, choke coils and other accessories, and compare the cost of all these to that of building a chopper, you will find that the chopper turns out to be less expensive, especially so if you consider modulator tube replacements, which is no small item. so that no matter how you consider the question, the chopper method of interrupting your C. W. is far superior to the buzzer method, from the point of view of distance covered, operation and economy.

Buzzer vs. Chopper Modulation

By Arno A. Kluge

SECOND PRIZE $5.00

IN selecting the type of modulation for transmitting telegraph signals with the C.W. transmitter, there are a number of important factors to be considered.

The ideal system of modulation should give the maximum signal strength with a minimum of tubes, should maintain a constant adjustment under long periods of service, and should produce the least possible interference by a continuous carrier wave.

The principal modulation systems in common use, are:

1. Buzzer in modulation transformer primary circuit, with either Heising or grid modulation system.
2. Buzzer in grid leak circuit.
3. Chopper in grid leak circuit.
4. Chopper in plate circuit.

In addition to the above, it is also possible to use the buzzer or chopper in the ground lead, but this is impractical except for very low powered sets, where there is no danger of an arc-over with the consequent destruction of the buzzer. Even then there is a loss in efficiency due to poor contacts, and the tone is not always the best.

Of the four systems outlined above, the first is perhaps most commonly used, owing to the fact that the buzzer can be used directly in conjunction with speech transmission, the transmitter being replaced by a buzzer and key in series. Figure 1 shows this system applied to the Heising modulator circuit, and in figure 2 to the grid modulation system. Of the two, the Heising system gives stronger and better signals than the grid system, but it requires two tubes. When using either

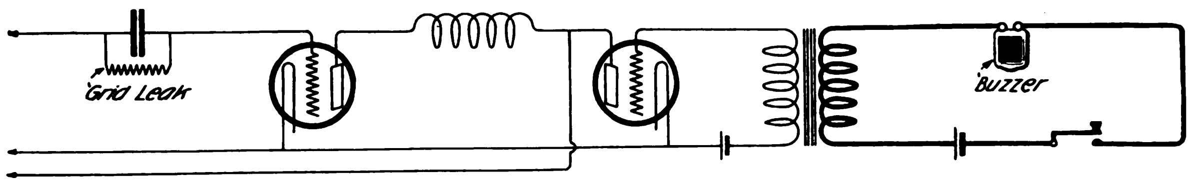


Figure 1

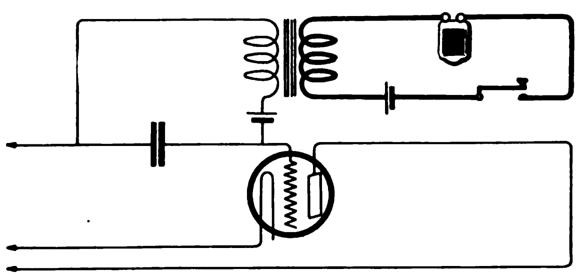


Figure 2

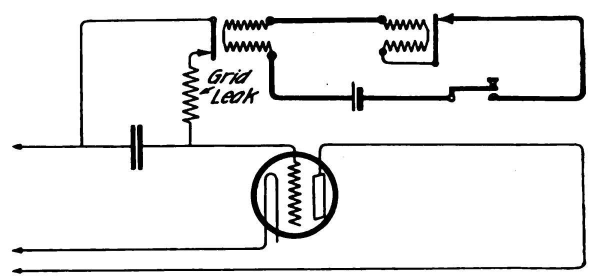


Figure 3

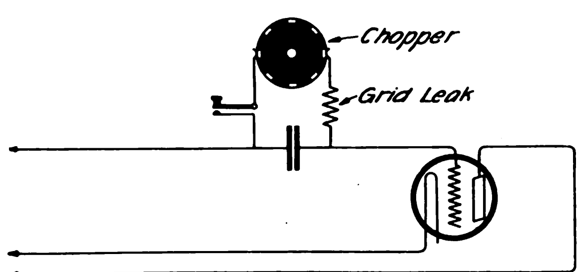


Figure 4

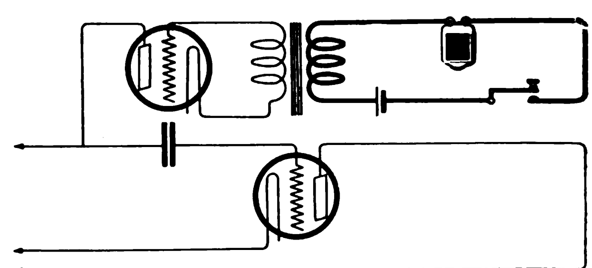


Figure 5

Circuit diagrams of various systems of modulation of these circuits, the contacts of the buzzer should never be shunted by a resistance, as is sometimes done to reduce sparking, but should be left open, to produce as sharp a break as possible in the transformer circuit.

It is well known that when the grid leak circuit of a vacuum tube oscillator is opened, the space current and antenna immediately drop to about 10 per cent. of their normal value. This characteristic is made use of in all grid leak modulation systems, such as systems 2 and 3.

In figure 3 is shown the second system with the buzzer in the grid leak circuit. It will be noted that two buzzers are required, the magnets only of the one being in series with the other buzzer. This arrangement is necessary, as otherwise, the grid leak circuit would still be completed through the coils, key, and battery, even when the buzzer is vibrating.

The above circuit gives very good results, but still leaves one thing to be desired. If our modulation system is to cause a minimum of interference, it should be so arranged that little or no energy is being sent out when the key is not depressed. To do this, a chopper is recommended, as then the key can be put in the chopper lead, as in figure 4, and the radiation will remain at a minimum except when actually manipulating the key.

The chopper may consist of a motor-driven commutator or special disc which will give sufficient breaks per second to produce a high tone. This commutator should be one in which the insulation between bars is about equal to the width of a bar. If a suitable one is not available, one can be constructed by using a bakelite disc with a set of holes drilled around the periphery, and these filled with brass studs. A spring on either side is used for contact.

A chopper has also been used in the plate circuit by some, but this method has several glaring defects. In the first place, very few choppers will stand up long when continually breaking a direct current of the voltage commonly used on transmitting tubes. Also there is more strain on the tube when continually breaking the plate circuit, and the note is not as clean-cut, owing to the time elapsing before the tube reaches its maximum oscillating value.

For the large power tubes, where the grid leak current is apt to become excessive for the small type chopper, a system as shown in figure 5 can be employed. Here a small 5-watt tube serves to conduct the grid leak current, and by modulating the grid of the 5-watt tube, excellent control of the larger tube can be obtained.

These different modulation systems open a broad field for experiment for the amateur, but, all things considered, the writer believes that grid leak modulation by chopper affords the best system of all.

Modulation by Buzzer or Chopper

By M. Wolf

THIRD PRIZE $3.00

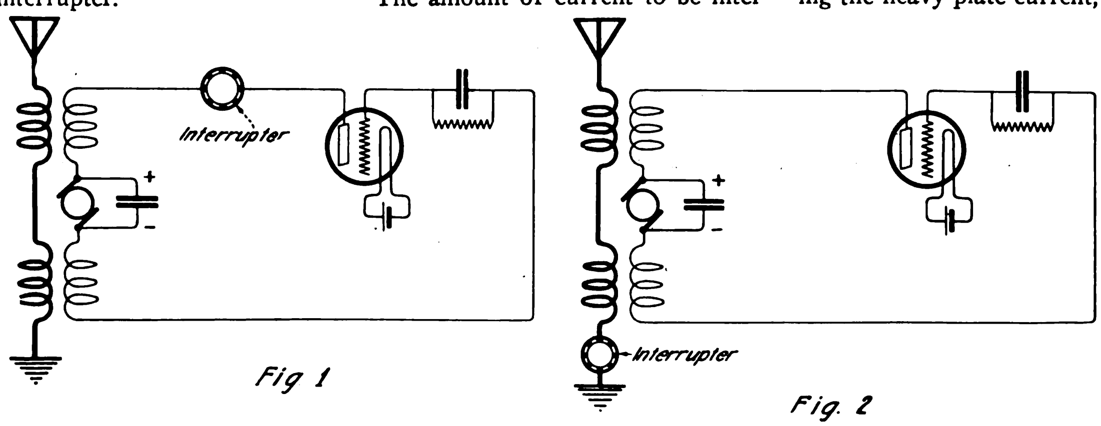
A COMPARISON of these two methods of interrupting continuous waves must take into consideration the following important factors:

1. Whether the modulation is effected at the transmitter end or receiver end.
2. The amount of current to be interrupted.
3. The amount of space occupied by the interrupter.
4. The economy and efficiency of the interrupter.

With regard to the last two factors a few words will dispose of them. The buzzer will always occupy much less space than any kind of chopper no matter how constructed, and the overall cost of the buzzer interrupter as compared with the chopper is very much lower. When the cost of materials and the labor of constructing a good chopper is taken into account it will be found to be far in excess of the buzzer which simply requires one or two dry cells to operate it. The chopper requires a driving motor, which in itself is a very expensive item. So that from these two points of view, apart from the performance of either, the buzzer is the preferable means.

The amount of current to be interrupted is a very important point to consider in making comparisons. The buzzer at best has very small contact surfaces which cannot conveniently be increased. The chopper may be built to have as large or small contact surfaces as one pleases. Consequently on sets where the interrupted current is very high or even moderately high the chopper is superior to the buzzer. In fact only the chopper can be used for these currents. In view of this fact it might be said that for high power transmitters the chopper is preferable to the buzzer, but that on low power transmitters either the chopper or buzzer may be used. However, I have found that the buzzer may be very effectively employed even in high power bulb transmitters, only provided it is properly placed in the circuit. It will probably be found that most amateurs connect their chopper in the positive lead from the D.C. generator, thus breaking the heavy plate current, or directly in the oscillating antenna circuit, thus breaking the antenna current, as seen in figures 1 and 2. The buzzer thus used cannot be employed in these high powered sets. However, I have found that equally good results can be obtained by placing the buzzer in the grid circuit in one of two ways, shown in figures 3 and 4.

In figure 3 the set was operated with the buzzer in series with the grid leak. The effect with this connection is excellent and if the buzzer is prop-



Circuits of modulating systems that break the antenna current erly adjusted a pure clear high-tone note is transmitted. The operation of the buzzer in this connection is very simple. When the buzzer contacts are open the grid leak is open and consequently the negative charge on the grid is not able to leak off with the result that there are no oscillations. When the buzzer contacts close the grid leak circuit closes and the negative charge leaks off and oscillations occur in the antenna. In this way the buzzer makes and breaks the oscillations at a high audible frequency and transmits a musical note.

In figure 4 I used a telephone transformer to step up the buzzer voltage and connected the secondary of the transformer so that the buzzer audio voltage is superimposed on the radio frequency voltages, thus modulating the radio frequency. This method of using the buzzer likewise gave very fine results. The first is preferable in that it gives good results and less apparatus is required.

To handle the power output of the average amateur tube transmitter the buzzer is just as efficient as the chopper, modulates just as well, occupies less space and is less costly. In my own experiments comparing the audibility at the receiving end of these two methods, that is, chopper and buzzer, while it is true that there is a slight advantage in favor of the chopper, about 20 per cent. at the most, I do not consider this sufficient to give the prize to the chopper. A matter of 20 per cent. better audibility is of course important, but the questions of cost, space, equal ability to handle different powered sets are just as important, and since the buzzer is superior in these factors, I have always used the buzzer.

When we consider the question of modulating at the receiver the buzzer is again superior. The current to be interrupted at the receiver is extremely small, and for best efficiency the interrupter contacts should be proportionately small. The chopper as built by the amateur has quite large and coarse contacts, out of all proportion to the received current. The buzzer contacts are better proportioned to the received current and can therefore be used to better advantage. The chopper would have to be constructed with a fine cat whisker contact to do the work properly, whereas, the buzzer has fine contacts ready made.

Everything considered therefore I have found the buzzer to give just as good service as the best chopper and it is superior as far as cost and space are concerned.

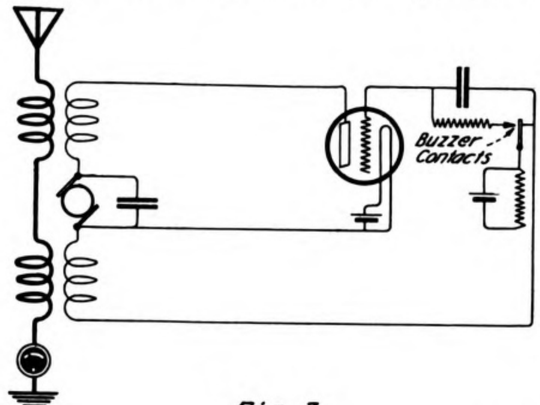


Fig. 3

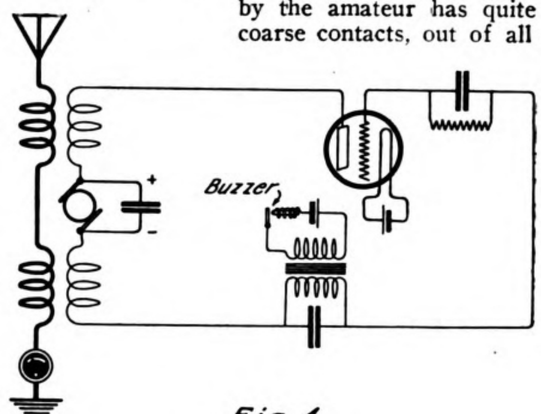


Fig. 4

Modulating systems having the buzzer in the grid circuit

Prize Contest Announcement

The subject for the new prize contest of our year-round series is :

FIVE WATT VACUUM TUBE TRANSMITTER

Closing Date :: :: December 1, 1921

Contestants are requested to submit articles at the earliest practical date.

Prize winning articles will appear in the February 1922 issue.

All manuscripts should be addressed to the Contest Editor of The Wireless Age.

The design of a circuit for obtaining maximum efficiency from a five watt V. T. Transmitter with minimum expense. This will be especially interesting to the amateur with a small pocketbook. Prize articles should contain data regarding construction of the various units. "B" Battery or 110 V D.C. with smoothing out apparatus should be employed for plate voltage.

PRIZE CONTEST CONDITIONS—Manuscripts on the subject announced above are judged by the Editors of THE WIRELESS AGE from the viewpoint of the ingeniousness of the idea presented, its practicability and general utility, originality and clearness in description. Literary ability is not needed, but neatness in manuscript and drawing is taken into account. Finished drawings are not required, sketches will do. Contest is open to everybody. The closing date is given in the above announcement. THE WIRELESS AGE will award the following prizes: First Prize $10.00; Second Prize, $5.00; Third Prize, $3.00, *in addition to the regular space rate paid for technical articles.*

Receiving the vaudeville concert staged in New York and received in Chicago and other cities. The transmitting set was operated by L. R. Lounsberry and Miss Alice Gowen acted as hostess to the New York party

The Monthly Service Bulletin of the

NATIONAL AMATEUR WIRELESS ASSOCIATION

Guglielmo Marconi *President* | J. Andrew White *Acting President* | H. L. Welker *Secretary*

Founded to promote the best interest of radio communication among wireless amateurs in America

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HEADQUARTERS: 326 BROADWAY, NEW YORK

THE first regular meeting of the season of the Executive Radio Council, Second District, was held at the East Side Y. M. C. A., East 86th street, New York, on September 20. In addition to transacting routine business, the Council adopted the following rules and regulations for the purpose of minimizing interference and improving general operating conditions in the Second District:

1. 7.00 a. m to 7.00 p. m.—Free air for all forms of transmission, including testing; 2, 7.00 p. m. to 9.50 p. m.—Local transmission only.(If high-powered stations desire to transmit during this period the input of transmitter must be reduced so as not to exceed ¼ K. W. Testing by any station during this period will be done only on last ten minutes of each half hour—20 to 30 minutes or 50 to 60 minutes, except last ten-minute period); 3, 10.10 p. m. to 1.00 a. m.—Long distance traffic only. (Only such stations as have been designated by the Traffic Supervisor as long distance traffic stations will transmit during this period);4, 1.00 a. m. to 7.00 a. m.—Free air for distance work (of all kinds); 5, The above includes all classes of stations—Spark, C. W., I. C. W. and Radiophone; 6, Radiophone broadcasting of speech and music is to stop at 9.50 p. m.; 7, All work by general or restricted amateur stations will be done on wave-lengths not exceeding 200 meters, and with a proper legal decrement; 8, All stations must be operated on reduced power whenever possible to avoid unnecessary interference; 9 Spark stations in calling will transmit the call of the station wanted three times and sign off three times—no more—with two minute intervals between calls. *Example*—2BK, 2BK, 2BK de 2JU, 2JU, 2JU—If a station called does not answer after having been called three separate times, do not repeat the call for 15 minutes. In answering calls, make the call letters of the station which has called three times, sign the letters of the station called once, and end with K. *Example*—2JU, 2JU, 2JU de BK-K—This procedure should be followed both in long-distance and local work. C. W. stations when calling other stations are allowed a double-length call. Call three times, sign three times, call three times, sign three times; 10, No station should transmit unless the operator is sure other nearby stations are "clear." 11, Instructions for routing traffic will be issued by the Traffic Supervisor according to conditions, but as a general rule traffic should be relayed to the stations best equipped or situated to handle it; 12, The International abbreviations must be used whenever possible. Conversations should be brief.

The Council decided to print these rules and regulations on cards 8½ x 11 and furnish copies to every transmitting station in the Second District.

The Council feels that it has taken a big step in the right direction and that its plan of self-government will result in big improvement in what had become an intolerable condition, especially during the evening when all classes of stations attempted to work at once.

According to the plan adopted for the enforcement of the regulation, the Traffic Supervisor of the Council will appoint assistant supervisors, each one of whom will be responsible for the observance of the regulations in a particular section of the district.

The Council as a whole will co-operate closely with the Chief Radio Inspector of the District in the enforcement of the United States radio laws.

▽ ▽

ACCORDING to the Detroit, Mich., News it is doubtful if the farmer is taking advantage of what is being done for him by means of radio. Market, grain and weather reports are being sent out daily to every section of the country. The radiophone is also doing its share to keep the rural districts in touch with the market centers. The latest news bulletins are being sent out daily along with concerts and entertainments.

The average farm is so situated that a reliable receiving station can be erected with little expense. The farm and its possibilities are envied by the city chap. There are no high buildings to obstruct radio waves and, with an antenna of moderate height, good results should be obtained. The benefits derived will more than pay for the cost of the station and will afford a pleasant pastime for those who are interested.

Farms supplied with electric power can install a transmitting station and thereby keep in touch with other stations, which would afford a rapid means of sending out and receiving information of all kinds.

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THE Nashville, Tenn., Radio Club had a radio exhibit at the state fair which gave all a chance to learn something about the wonders of wireless telegraphy and wireless telephony. An aerial was erected on one of the state fair buildings and several sets installed. The aerial consisted of four wires stretched between two wooden spreaders and the whole suspended from two flagpoles. Following is a list of some of the stations heard: Bordeaux, France; Paris, France; Rome, Italy; Nauen, Germany; Stavanger, Norway; New Brunswick, N. J., Key West, Fla.; Colon, Canal Zone; San Diego, Cal.; Annapolis, Md.; Carnarvon, Wales; Hong Kong, China; the Itawana Islands and other places. Besides these large high-powered stations a great many other stations of low power, both commercial and amateur, were heard.

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AT a meeting held on September 13 the radio amateurs of Flint, Mich., organized the Flint Radio Association with an executive council. Officers of the executive council were nominated and elected by popular vote of the entire assembly.

Officers comprising the executive council are Frank D. Fallin, Guy R. Cowing, Earl Brockway, Charles Valentine, Thomas Lathrop, William Forbey and N. G. Doudell. The executive council will elect their chairman, secretary, treasurer, traffic manager and other officers necessary to carry out the business of the association and schedules and other matters of operating will be decided upon. In short, Flint is out to eliminate QRM and do its share in handling traffic and before winter and the radio season is in full swing, Flint will have some good spark stations as well as C. W.

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THE last regular meeting of the Detroit Radio Association was called to order by President Darr, who gave a short talk on the plans of dividing the club as the Chicago amateurs have done. The most important reason for dividing the association is that difficulty is experienced in trying to make one organization interesting to both the beginner and the advanced radio men. Under this plan, several small clubs will be organized which will be under the board of directors and the executive council. Each club will have a representative in the council and all laws and regulations will be made by this body, which being made up of delegates from the various clubs, shall be the governing body.

Each separate organization will have its own officers and can hold its meetings when and where it pleases. Once a month the secretaries of the various clubs shall send in a complete report of the activities during that month.

Edward Boyes explained the various details of the division of the association, saying that the head of the association shall be the board of directors which will grant charters to other clubs that care to become affiliated with the Detroit Radio Association. At the next meeting of the association a new board of directors will be elected and everyone interested in radio should be on hand to assist in this election. There is to be a traffic committee to take care of all complaints of interference.

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THE Troy Y. M. C. A. Radio Club held its first meeting of the season on September 28, at which plans for a new station were discussed. Last year the club station, known as 2SZ among amateurs, established the record for amateurs of the capital district by working a station at Wichita, Kansas, 1,300 miles away. It is hoped that this record will be bettered by 2SZ this season. Officers for the new year will be elected at a later meeting to be held at the Y. M. C. A.

▽ ▽

THE Radio Engineering Society held its bi-weekly meeting in The Dispatch Building, Fifth avenue, September 24, with President Coleman presiding. Proposed changes in the club's constitution were finally acted upon. These changes were: In electing officers the president can cast a vote on the second ballot in case of a tie; all checks drawn for the society must be signed by the secretary and countersigned by the president; the age limit is removed, allowing admission to anyone provided the club acts favorably upon the application; club annual dues from $6 to $4. The initiation fee of $1 remains.

Chairman Hineline of the program committee outlined the plans of the society for the coming winter as regards educational work, lectures and entertainments. He advised the club that three lectures were already outlined for successive meetings of the society, beginning Saturday evening at 8:30 sharp. Mr. Woolley of the transformer engineering department of the Westinghouse company and head of the electrical section of the Casino Tech night school will give the lecture.

Mr. Hineline entertained the society with a constructive lecture on chemical rectifiers, a summary of which will be published in this column at a later date, due to its importance in C-W work.

The following regulations for the operation of amateur stations were adopted:

6.30 a. m. to 7.30 p. m.—Free period for testing or anything.

7.30 p. m. to 9 p. m.—Period local radio work.

9 p. m. to 10 p. m.—Radiophone concert periods. (All amateurs stand by for this period).

10 p. m. to 11.30 p. m.—Period for purely DX amateur work.

11.30 p. m. to 1 30 a. m.—Traffic DX. (Those working preceding period should not work during this period).

1.30 a. m. to 2.30 a. m.—Transcontinental tests.

2.30 a. m. to 6.30 a. m.—DX and relay work.

It may be said here that Chief Radio Inspector Terrell is much interested in this national plan and pledges his full support in its consummation.

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THE first meeting of the Carson Amateur Radio Association was held July 7th at the home of the Chief Inspector, Carson City, Nevada. The following officers were elected: President, C. F. Riley, Jr.; Chief Inspector, Herman Keyser; Chief Operator, John W. Mackey. The charter members of the association number nine, but the membership has grown greatly.

The purpose of the association is to help new operators; to enable them to have a wireless set at their disposal and to obtain knowledge in radio. Code practice and instructive talks are being arranged for.

Correspondence from other clubs is invited. Address all communications to John W. Mackey, 311 West King Street, Carson City, Nevada.

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THE first meeting of the winter season for the Milwaukee, Wis., Amateur Radio Club was held Thursday, September 29, at the public library. Officers were elected. The club, which operated last winter under the direction of the School of Engineering, is composed of about 125 young men who are seeking to further the interests of wireless telegraphy.

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AT a meeting of the San Joaquin Valley Radio Association, held on September 21, several new members were initiated as a result of the publicity gained by the exhibit of the organization at the county fair. An increased interest, on the part of the public, in the activities of the club was another favorable result.

A committee appointed to revise the constitution of the organization consisted of Kenneth Adams, William Clisham and Calmo Wiles. Mr. Adams was also chosen to go to San Francisco and report to Major Dillon, official radio inspector of the United States government for the west or sixth district, concerning the activities of the association during the past year.

After a talk by R. J. Charles, general secretary of the "Y," the initiation of new members took place. It was decided that the meetings of the club be held in the Y. M. C. A. building every second and fourth Wednesdays in every month and anyone interested in wireless is cordially invited to attend.

Distance Records

WHEN signals from a radio station are heard at unusual distances it is proof that the station is an efficient radiator of energy. The location, apparatus, construction and operation of an efficient station is therefore, of great interest to all amateurs, and THE WIRELESS AGE wants this information.

You are therefore requested to send us a monthly list of distant amateur stations heard, which will be published regularly. Report only stations located 200 miles or more distant from your station. Arrange the calls by districts (each district a paragraph), and the calls in alphabetical order.

In a second group arrange the stations you hear regularly by district, including only two or three stations, to determine consistency of performance.

State whether the stations heard use a spark or C. W. transmitter. THE WIRELESS AGE will follow the records closely and whenever possible will secure and print illustrated articles on the stations consistently heard over long distances, for your benefit and the benefit of amateurs.

If a station is an efficient radiator of energy, it should be given proper credit in the history of amateur progress, and at the same time you will be given credit for efficiency in receiving in having heard it, as your name, address and call letters will be published with all lists submitted by you.—THE EDITOR.

Stations Heard and Worked

STATIONS worked should be enclosed in brackets. All monthly lists of distant stations worked and heard which are received by the 10th of the second month will be published in the next month's issue. For example, October lists received by November 10th will be published in the December issue. Spark and C. W. stations should be arranged in separate groups.

2AQP (SEPTEMBER) E. LAUFER, 699 East 137th St., New York.

Spark: 1ADL, 1AMD, 1ARY, 1ASF, 1BWY, 1CM, 1CY, 1DPZ, 1GM, 1HK, 1IN, 1NM, 1OE, 1OT, 1SN, 2AJP, 3AC, 3AAR, 3AMQ, 3AQR, 3CC, 3GX, 3HJ, 3HX, 3IX, 3IW, 3MY, 3MZ, 3OU, 3PB, 3VW, 3ZO, 3ZZ, 4BQ, 4EA, 4EY, 8AL, 8ACF 8ACY, 8AFA 8AFB, 8AFD, 8AFH, 8AGK, 8AIB, 8AJE, 8AJT, 8AJW, 8AMQ, 8ANO, 8AQV, 8AWP, 8AWF, 8AXC, 8AYN, 8AYS, 8AYT, 8BO, 8CV, 8EA, 8EV, 8EZ, 8GW, 8HM, 8HU, 8IN, 8MY, 8OA 8OI, 8RQ, 8RU, 8SP, 8TJ, 8TT, 8UC, 8UK, 8UP, 8WY, 8ZD, 8ZN, 9AIR, 9ACY, 9AWZ, 9AZA, 9BP, 9CP, 9GX, 9ME, 9OX, 9TK, 9UH, 9ZN. Canadian, 3BP.

C.W. 1AKG, 1AJP, 1AZJ, 1BKA, 1BYX, 1CAK, 1CF, 1CK, 1ES, 1FW, 1GF, 1IN, 1OE, 1UN, 3AQR, 3HG, 3VV, 3ZZ, 4GL, 8AIO, 8AST, 8AYW, 8BO, 8BQ, 8BPL, 8BVX, 8DE, 8DR, 8EQ, 8IQ, 8IV, 8NQ, 8RQ, 8UK, 8XK, 8XM, 9AIO.

Most consistently heard: First District, Spark 1ADL, C. W. 1AJP. Third District, Spark 3OU-3VW-3IW, C. W. 3ZZ. Fourth District, Spark 4EY, C. W. 4GL. Eighth District, Spark 8RQ-8AWP-8SP, C. W. 8DE. Ninth District, Spark 9UH, C. W. 9AIO. Canadian, Spark 3BP.

2WR (SEPTEMBER) A. G. WESTER, 1075 Chancellor Ave., Hilton, N. J.

1GM, 1OE, 1OT, 1SN, 1ZE, 1ADL, 1ARY, 1BDC.

3AC, 3DW, 3EZ, 3HG, 3HJ, 3IW, 3MX, 3XM, 3AGR.

4BQ, 4DL, 4EY, 4GL (C.W.)

8BO, 8EH, 8FE, 8HG, 8HO, 8HQ, 8HU, 8IH, 8QH, 8RP, 8RQ, 8RU, 8RV, 8SP, 8TK, 8TO, 8WY, 8YE, 8YN, 8ZD, 8ZN, 8ZR, 8ACF. 8AFD, 8AFS, 8AGK, 8AIN, 8AIO, 8AMP, 8APD, 8AQV, 8AWF, 8AWP, 8AXC, 8AYN, 8AYS, 8BCO, 8ARD.

9AC, 9CP, 9DO, 9KO, 9ME, 9QH, 9ZJ, 9ZN, 9AAW, 9AMK.

Canadian: 3BP.

Stations consistent: 1OE, 1ZE, 1ADL, 1ARY, 3HG, 3IW, 4EY, 4GL, 8BO, 8RQ, 8RU, 8SP, 8ZD, 8ZR, 8AGK, 8AYN, 9ZN, 9AAW. Canadian, 3BP.

2OM (SEPTEMBER) F. B. OSTMAN, Ridgewood, N. J.

Spark: 1ACO, 1ACZ, (1ADL), 1AFZ, 1AHR, (1AKG), (1AMD), (1ARY), (1ASF), (1AW), (1AZK), (1BCF), (1BDC), 1BDT, (1BGF), (1BGN), 1BKP, 1BVB, 1BZF, (1CM), 1CY, 1DF, (1DY), (1DZ), 1FM, (1GM), (1HK), (1IA), (1OE), (1OT), (1RV), 1RX, (1SN), 1UL, 1XX, (1ZE)

(3BP), (3EI) Canadian.

3AAN, (3AC), 3ACT, 3AIS, (3AL), 3AQR, 3ASJ, 3BC, 3CC, 3DN, 3DR, 3DW, (3HJ), 3HX, (3IW), 3KM, 3MY, 3NX, (3OU), 3TH, (3UC), (3UQ), 3US, 3VV, 3WT, 3XF, (3XM), (3ZZ).

4BQ, (4BX), 4DH, (4EA), (4EY), 4FD, 4GN, 4XC, 5DA, 5FV, 5ZA, 5ZK, 5ZL.

8ACD, (8ACF), 8ACY, (8ADO), (8ADR), 8AEV, 8AFA, (8AFD), (8AFS), 8AFU, (8AGK), 8AHH, 8AHU, (8AIB), 8AIM, 8AJE, 8AJT, 8AL, (8ANO), 8ANP, 8ANV, (8ANW), (8AOT), 8APB, 8APP, (8AQV), (8ARD), (8AVT), (8AWP), 8AWX, (8AXC), 8AY, (8AYN), (8AYS), (8BBU), (8BCO), (8BDY), 8BFV, 8BJW, (8BO), 8BOI, (8BRL), (8CV), 8DK, 8DR, 8DY, (8DZ), 8EA, (8EV), 8EZ, 8FD, 8FE, (8FT), 8FU, 8GO, (8HU), (8ID), (8IL), (8IN), 8JU, 8LH, 8LN, (8MM), (8OA), 8OI, (8OJ), (8RQ), 8RT, (8RU), (8SP), 8TB, (8TJ), 8TT, 8TY, 8TZ, 8UC, (8UP), 8VC, 8VE, (8VQ), 8WR, (8WY), 8XF, 8YN, 8ZA, (8ZD), 8ZL, 8ZN,, 8ZR,

9AAW, 9ACY, 9AIS, 9AIU, 9ASJ, 9AWZ, 9AZA, 9BP, 9CP, 9DAX, 9EE, 8EZ, 9FR, 9HG, 9HM, 9HR, 9JN, 9LQ, 9MC, 9ME, 9MK, 9NQ, 9OX, 9PC, 9PS, 9QH, 9UH, 9UU, 9ZJ, 9ZN.

C. W.—(1AJP), (1AZJ), (1AZX), (1BWK), (1OE-cw-fone), 1TS, 3BZ, 3HG, 4AA, 4GL, 5DA, 8AIO, (8AWP), 8BK, 8BPL, 8DE, 8JQ, (8RQ), 8UK, 9AJA.

2BK, OLD POST ROAD GARAGE, TARRYTOWN, N. Y., (JOSEPH B. SLAVIN, OPERATOR), (OCTOBER 1 TO OCTOBER 10)

1UN, 3BZ, (3RF), 4GL, 8HB, (8HA), 8DE, (8LV), 8VY, 8XK, 8ZR, (8ABO), (8ACF), 8AHH, (8AQZ), 8AXC, 8AXE, 9AW, 9ZJ.

2EL, H. H. CALMAN, FREEPORT, L. I.

8AJT, (8AHH), (8ACF), (8RA), (8SP), (8XE), 1AW, (1BWY), (1MK), (3BP Canada), (3HG cw), (3OU), 3BZcw, (4BY), (4EA), (4FD), (4FF cw), (4GL cw) and 2OE.

ONE of the largest crowds ever accommodated by the Kirkland open air dancing pavilion at Kirkland attended the Utica Radio Club's novelty wireless telephone dance at Utica, N. Y., on the evening of September 8.

Henry Brown of Clark Mills had charge of the set at the pavilion while Clifford Waddington managed the transmitting set in the city. During the evening word was received by the operator at the pavilion that the music sent out from Utica had been heard in Syracuse, Pittsburgh and Hartford.

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FOR the first time in the history of politics, so far as is known, the wireless telephone was called into use at Haverhill, Mass., on September 8. The message went broadcast from Haverhill, which now has the distinction of leading the country in this unique campaign accessory. It was a Pingree speech read by Charles S. Harding from his station in Bradford. The next morning results of this speech came in by mail and telephone from all over the district. In some cases arrangements had been made to have the wireless apparatus attached to loud speakers which magnified the sound and enabled families and friends to hear the speech at the same time.

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THE Hudson City Radio Club held its regular monthly meeting at headquarters, 89 Franklin street, Hoboken, N. J., on September 23.

Vincent Gilcher has been unanimously elected traffic manager of the club. The following were admitted to membership: Chester Rackey, 97 Thorne street, Jersey City; Arthur L. Keefe, 269 Ogden avenue, Jersey City; Irmfred Brauner, 579 Tenth street, West New York; Arthur Worth, 611 New street, North Bergen. ,

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ROY A. ANDERSON, Box 206, Ketchikan, Alaska, writes the N. A. W. A. as follows: During the past few months I have received many requests for information as to how I am able to hear POZ, with only a bulb detector and no amplifier. What type of aerial do I use? What kind of a ground have I? How loud are the signals? When can I hear POZ? What type of apparatus have I? These and many other questions have been asked and it gets rather tiresome answering so many. In the first place it seems to me that it would be appropriate to enclose a stamp. Some do not, but the majority do.

Now, it should not be necessary to ask all those questions, because what will work here will not work there. In other words, I mean that if someone in California were to take my set and string up an aerial just like mine, and then hook up a ground such as I use, it would not surprise me to learn that he would be unable to hear the stations that I hear. We all know that atmospheric conditions tend to vary the intensity of the signals, moreover height is one of the most essential things.

With all this in mind, there is very little information I can give that would tend to help any of our fellow hams; rather it would hinder them. The best way is to experiment. Little suggestions from the more experienced DX men would, of course, prove helpful, but I know that I had to do only a little experimenting, for the first set I got was the one with which I heard long distances.

My aerial is a single-wire (No. 14 copper) 225 feet long, 30 feet high on one end and 15 on the other, but in the center there is sort of a valley, which the aerial crosses, that probably brings it fifty feet from the deepest reach of this valley which extends downwards toward the channel. Across this channel there are more mountains and to the east there is a mountain rising to some 3000 feet. Immediately behind the farther end of the aerial is a steep hill which extends toward the eastern range of mountains. To the north the same conditions are true and to the west, across the channel, are more mountains. The aerial extends from east to west, almost directly, and it will be seen that it is practically surrounded by mountains and very mountainous country. The ground lead is about twenty feet long and is attached to a copper plate, probably an eighth of an inch thick, three and a half feet long and a foot wide. As the country is not very "soilly" it is only buried five or six inches under the surface. Probably a counterpoise would be better, but I have not, as yet tried it.

Maybe this is a regular "freak." I do not know. Nevertheless I believe that climatic and geographical conditions tend to make every locality more or less distinctive and moreover I believe that for this phase of radio, experience is the best and only teacher.

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THE first high school wireless press service in the United States will be in operation in and around Los Angeles, California, within the very near future, and the system is expected to have its initial tryout, for the next edition of the student publications of the Pasadena and Long Beach High Schools.

David Livingstone, editor of High Life, the student weekly at Long Beach High School, is the originator of the idea. Through the columns of a recent issue of the paper, he suggests that radio students in the schools, transmit and receive news for their school publications. Last-minute news of interest to student readers in other schools could thus be sucured for publication in a shorter time, than by the old mail exchange method.

Wavemeters

By Anon

THE wavemeter itself is fairly simple in design, for the fixed inductance and variable condenser or capacity are found in all of them, although some types have the variable inductance and fixed capacity. Figure 1 illustrates the method in which the two principal parts are connected. The inductance is generally wound with Litzendraht wire. On wavemeters the condenser scale is generally calibrated so that the wave length may be read directly from the condenser scale.

The frequency is variable and to tune a set we must place the wavemeter in resonance with the circuit to be tuned. With only the inductance and

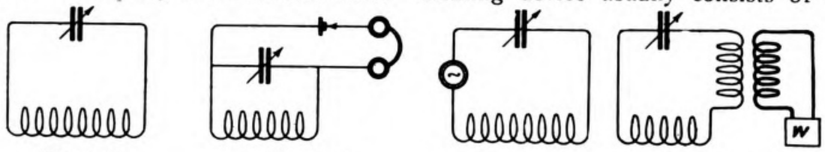


Figure 1 Figure 2 Figure 3 Figure 4

Wavemeter circuits

capacity we have no means of knowing whether or not the wavemeter and the circuit whose wave-length is to be determined are in resonance with each other, we therefore have to have some sort of an indicating device. This indicating device usually consists of a crystal detector and telephone receivers. The detector is in series with the phones and the whole shunted above

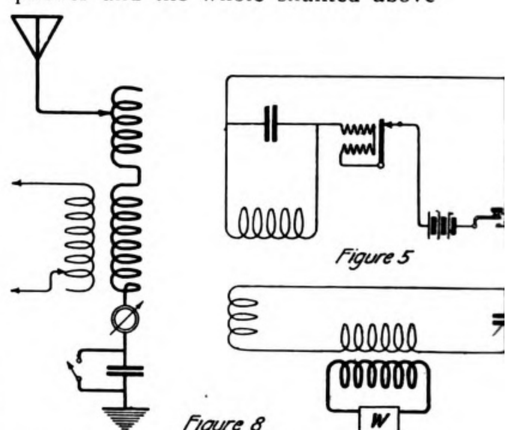


Figure 5—Wavemeter used for calibrating receiver

Figure 8—Wavemeter used to measure length of radiated wave

the wavemeter condenser. This diagram may be found in figure 2. If we are to place the wavemeter in resonance with a transmitter, or some part of it, we press the key and then vary the capacity until the signals heard in the telephones are at a maximum.

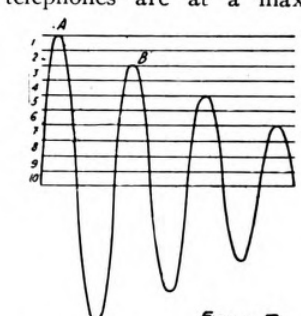


Figure 7

Figure 7—Logarithmic decrement

This is a sign that the two circuits are in resonance. Another type of indicating device to be used with a wavemeter is shown in figure 3. This type consists of a small lamp. When the lamp burns brightest, the two circuits are said to be in resonance.

In some instances it is necessary to use some type of hot-wire measuring instrument. This usually consists of a hot-wire wattmeter or ammeter. The former is the more common. Figure 4 illustrates the hook-up of the hot-wire wattmeter with the wavemeter.

In order to calibrate a receiver it is necessary to set up weak electromagnetic waves. To do this we use the wavemeter with a key and buzzer attachment. This forms a small transmitter, suitable for setting up weak electromagnetic waves. The method of connection is shown in figure 5. There are other types of indicators used for the same and different purposes, but the most important ones and the ones for which the average operator will find use are given above.

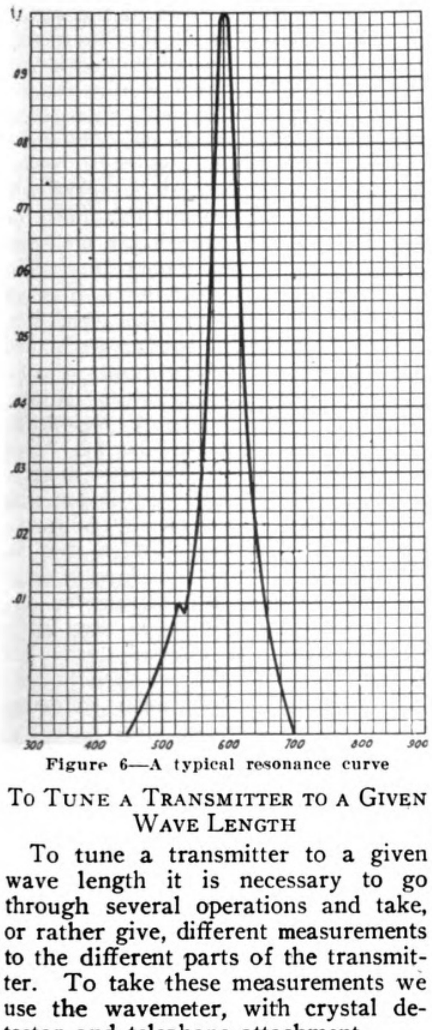


Figure 6—A typical resonance curve

TO TUNE A TRANSMITTER TO A GIVEN WAVE LENGTH

To tune a transmitter to a given wave length it is necessary to go through several operations and take, or rather give, different measurements to the different parts of the transmitter. To take these measurements we use the wavemeter, with crystal detector and telephone attachment.

The first step is the tuning of the closed oscillatory circuit, which consists of the condenser, primary of the oscillation transformer and the spark gap. Variation in this circuit is made by means of clips attached to the condenser spark gap leads. The wavemeter is then tuned to the desired wave length and the detector adjusted to the most sensitive point. The wavemeter is placed in inductive relation with the circuit as in figure 10. With the aerial and ground disconnected from the secondary of the oscillation transformer, the key is pressed. The clip attachment is then changed from turn to turn on the inductance, it being the only variable in this circuit. When the signals heard in the telephones is at a maximum, the wavemeter and the closed circuit are in resonance, and the closed circuit is tuned to the same wave length as is the wavemeter. In performing the above operation, care should be taken so as not to get the wavemeter in too close inductive relation with the circuit of the transmitter.

Before going any farther it is necessary to have the aerial circuit in resonance with the closed oscillatory circuit, just tuned. If you do not know the natural wave-length of the aerial, it should be determined, for it may have a natural wave-length longer than is desired. This would necessitate the adding of capacity in order to lower the length of the radiated wave. To find the natural wave-length, which is the length of wave, the aerial will radiate without having inductance or capacity added in the circuit, we again make use of the wavemeter. The most common method is to insert a spark gap in series with the aerial, i. e., one side connected to the aerial and the other side to the ground. An induction coil or transformer is then shunted across the spark gap leads. This forms what is called a "plain aerial transmitter." The wavemeter is then placed in inductive relation with the earth lead, as shown in figure 11. Current is then supplied to the primary of the step-up transformer or induction coil and the wavemeter condenser is varied until the sound in the headphones is at a maximum. The natural wave-length can then be read direct from the wavemeter condenser scale if it is calibrated.

Suppose that you wish to tune your transmitter to 325 meters and you find that the natural wave-length of your aerial is only 200 meters; it will be necessary for you to add inductance. As the closed circuit is tuned to the desired wavelength, it is only necessary to place the closed and open circuits in

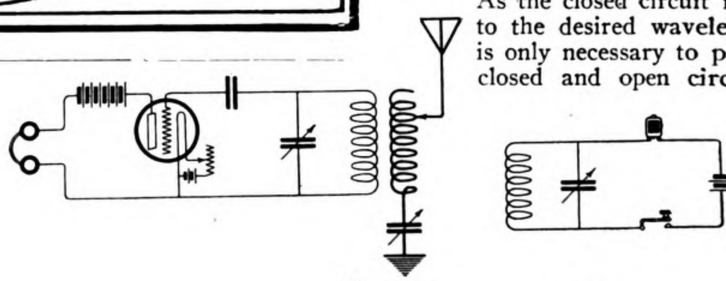


Figure 9

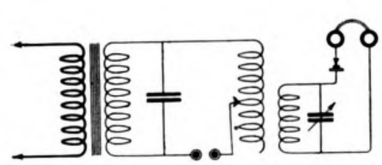


Figure 10

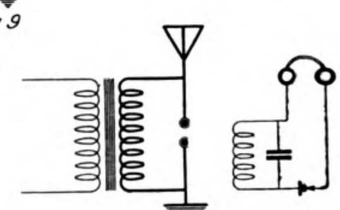


Figure 11

Figure 9—Wavemeter used to calibrate a receiving circuit. Figures 10, 11—Measuring length of closed circuit and wavelength of antenna

resonance. To do this the key is pressed and the reading of the ammeter in the aerial circuit is noted. The aerial tuning inductance is then varied, and with each variation the reading of the hotwire ammeter is noted. When this reading is at a maximum, the two circuits are in resonance.

The next and last step is the measuring of the length of the radiated wave. It seems to be a self-evident fact that the length of the radiated wave would be the same as that of the transmitter itself, but it is not always so. This is because of the mutual induction between the primary and secondary, and the consequent transfer of energy from the open back into the closed circuit. The result of this is the radiation of two waves and is commonly called a "broad wave." Neither of these waves will be on the desired wave-length; one will probably be above it and one below. The government regulations define a pure wave as a wave radiated by a transmitter when the energy of any of the lesser waves does not exceed 10 per cent. of that in the greater wave, and they require that all stations emit a "pure wave."

The wavemeter, with detector and telephone attachment, has heretofore been used, but this time the wavemeter, with the wattmeter attachment, is to been used. The wavemeter will be affected by the radiated waves only. It is placed some distance from the transmitter. The key is then pressed and the capacity varied. If the radiated wave is "broad," there will be a maximum reading of the wattmeter in more than one point. If it happens that one of these readings is above and the other below the required wave-length, the coils of the oscillation transformer must be separated until the wattmeter registers a maximum on the required wave and until it is less than 10 per cent of the required wave on any other wave-length.

TO DETERMINE THE PERCENTAGE OF COUPLING

We speak of the coupling between the open and closed circuits, or rather the coupling between the primary and secondary, in terms of percentage. In order to obtain the percentage of coupling we place the wavemeter in inductive relation with the aerial and note the length of the radiated waves. The lengths of the longer and shorter waves are then squared and the square of the shorter wave is subtracted from the square of the longer wave and the whole divided by the sum of the squares of the longer and shorter waves and the result thus obtained multiplied by 100. The following formula will probably make it clearer:

$$K = \frac{\lambda_2^2 - \lambda_1^2}{\lambda_2^2 + \lambda_1^2} \times 100$$

Where $K =$ percentage of coupling, $\lambda_2 =$ longer wave. $\lambda_1 =$ shorter wave.

PLOTTING OF RESONANCE, CURVES, ETC.

The wavemeter is also made use of in the plotting of resonance curves, curves or graphs showing the wave-lengths of the open and closed oscillatory circuits, with varying amounts of inductances, etc. To give the reader a general idea of the plotting of such curves, the method of securing resonance of the radiated wave will be treated here. The wavemeter with hot-wire wattmeter, in series, is used. The wattmeter should have a scale of from .01 to .1 watt. The wavemeter is then placed in inductive relation with the open or aerial circuit. At this juncture it would be well to state that the wavemeter should be in such a position as to give the wattmeter a reading at or near maximum when in resonance with the circuit.

When the wavemeter and the circuit are in resonance the reading of the wattmeter should be observed. The capacity should then be varied and at various points off resonance the readings of the wattmeter and wavemeter should be observed and marked on a piece of graph paper. After completing the observations on wave-lengths above and below the wave-length of the transmitter, a common line or curve should be drawn through all the points marked.

Figure 6 shows a typical resonance curve, plotted from an average 600-meter transmitter. It will be noted that on 600 meters (resonance) the wattmeter gives a maximum reading. At 450 meters the reading is zero and the same again at 700 meters. From about 550 to 600 and again from 600 to 650, the decrease is less gradual than it is from 450 to 550 and 650 to 700.

THE MEASUREMENT OF LOGARITHMIC DECREMENT

The regulations of the United States require that the logarithmic decrement per complete oscillation in the wave trains emitted by a transmitting aerial shall not exceed two-tenths (.2) except when sending distress signals or messages pertaining thereto.

Figure 7 illustrates the meaning of logarithmic decrement. It will be noted that the first wave is divided into 10 equal parts, each one of these being one-tenth of the initial oscillation of the one terminating to A. To comply with the government regulations the decrease in amplitude of the next wave cannot exceed two tenths (.2) of the preceding wave. Therefore the amplitude of the next wave in the same direction must terminate on B or above, and so on until the wave train has entirely decayed.

To measure the logarithmic decrement of a train of oscillations, we use the wattmeter and small transformer attachment on the wavemeter. The condenser scale should give the capacity in microfarads in order to simplify operations. The wavemeter should be placed in inductive relation with the aerial circuit, as in figure 8. This figure also applies to measuring the length of the radiated wave. The capacity is varied until the wattmeter gives a maximum reading. This is the resonance position. Note the reading of the wattmeter and the capacity in microfarads. Then decrease the capacity until the reading of the wattmeter is one-half of what its reading was at the resonance position. After this has been done the values are inserted in the following formula.

$$DT + DW = \frac{Cr - C_1}{Cr} \times 3.1416$$

Where DT=logarithmic decrement, DW=logarithmic decrement of wavemeter. Cr=capacity of wavemeter condenser at resonance. C_1= capacity of wavemeter condenser at position where reading of wattmeter was one-half of its reading at resonance.

To Measure the Wave-Length of a Distant Station

The receiving set is first adjusted to resonance with the distant station and the wavemeter is then adjusted to resonance with the receiver in the manner described above. The wave-length of the distant station may then be read direct from the wavemeter scale.

Figures 10 and 11 show the position of the apparatus for measuring the length of the closed oscillatory circuit and for measuring the natural wave-length of the aerial.

Queries Answered

ANSWERS will be given in this department to questions of subscribers, covering the full range of wireless subjects, but only those which relate to the technical phases of the art and which are of general interest to readers will be published here. The subscriber's name and address must be given in all letters and only one side of the paper written on; where diagrams are necessary they must be on a separate sheet and drawn with India ink. Not more than five questions of one reader can be answered in the same issue. To receive attention these rules must be rigidly observed.

Positively no questions answered by mail.

J. H. B., Jr., St. Louis, Mo.

Q. 1. For several years I have been using information taken from THE WIRELESS AGE and found it to be correct and accurate.

I noticed an article in the August issue entitled, "Filament and Plate Current from a Single Source for C. W. Work," by John F. Bront, and I feel sure that the "dope" on the transformer is incorrect. I am enclosing the correct data for C. W. transformer for voltage as follows: Primary, 110 volts; secondary, 750 volts, centre tap giving 325 volts per side; filament, 12 volts, centre tap giving 6 volts per side; primary winding, 430 turns No. 20 D. C. C.; secondary winding, 2924 turns No. 26 D. C. C.; secondary winding tapped at 1462 turns; filament winding, 46 turns No. 18 D. C. C.; filament winding tapped at 23 turns.

Number of turns primary at 110 volts

$$= \frac{10^8 \times Ep}{4.44 \times f \times A \times Bm} = \frac{100,000,000 \times 110}{4.44 \times 60 \times 1.9 \times 50,000}$$

= 435 turns.

$$\frac{\text{Secondary turns}}{\text{Primary turns}} = \frac{750}{110} = \frac{Ep}{Es.}$$

$$\frac{750}{110} = \frac{\text{Sec. Turns}}{435} = 2962 \text{ turns Sec.}$$

$$\frac{Ef}{Ep} = \frac{12}{110} = \frac{\text{Filament turns}}{435} = 47 \text{ turns filament}$$

Ep=Primary voltage
Es=Secondary Voltage
Ef=Filament voltage
f=Frequency
A=Area of core
Bm=Flux of gauses per sq. in. of core.
Core=6" x 4½" x 1¼".

Ans. 1. We do not see how you are able in the formula to substitute 1.9 for the core area when it is 5.63 inches by computation. Naturally this would cause the entire computation to be in error.

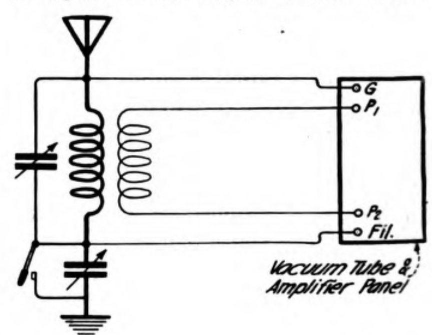
▽ ▽

H. J. L. G., Richmond Hill, L. I.

Q. 1. Will you please give a receiving circuit so that the following instruments will respond to wireless signals?

1. Grebe vacuum tube detector and single stage audio frequency amplifier.
2. Murdock variable condensers .001 mfd.
3. DeForest honey comb loose coupler.

Also the proper aerial and if the instruments alone are not enough, the ones needed to respond to wave lengths of 3,000 meters?



Ans. 1. An aerial 4 wires 100 ft. long. The proper coils would be: C_1—L 150; C_2—L 100. This is a circuit which will receive undamped waves as well as damped waves.

▽ ▽

E. L. G., Schenectady, N. Y.

Q. 1. In the July number of The Wireless Age you published the statement in answer to an inquiry that it is possible to get two stages of amplification using a crystal detector. Several of my friends and myself are interested to know how it can be done. Will you please give the apparatus and hook-up necessary to accomplish this?

Ans. 1. The reply was given not as stated in your letter, but as follows: "As regards the reception of phone conversation a crystal detector with two stages of amplification will work just as well as a vacuum tube detector and one step of amplification."